# NEW DEVELOPMENTS IN RAILWAY MODELLING

RECENT TENDENCIES, NEW DESIGNS AND USEFUL GUIDANCE

By EDWARD BEAL

*PROFUSELY ILLUSTRATED BY THE AUTHOR, AND WITH PHOTOGRAPHS*

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# AUTHOR'S FOREWORD

THE purpose of this book is to indicate to the railway modelling enthusiast anything of outstanding value in recent developments connected with the craft, to offer new designs for standard features such as are always of great acceptance, and in a general way to transmit to the constructor fresh and useful ideas for his guidance. It is actually the kind of work upon the subject that could well be repeated at intervals of every year or two, especially in times more fruitful than the past four or five years have been.

During those years, however, the periodicals devoted to this work have, in this country and America, valiantly carried on their task in the interests of both civilian craftsmen and those in the forces, the latter in particular having vastly benefited by this ministry. There has never been anything like the demand for this form of writing than during the war years, for most people have been denied the use or accessibility of materials, and have therefore kept alive their interest by reading and planning for the future. Something is attempted in this book by way of encouragement and inspiration to devotees who are suffering from these deprivations.

The aim has been to keep in mind the requirements of workers in OO-Gauge, HO-Gauge and O-Gauge, and the bulk of the information given will accord with any of these standards. In such an effort, the writer has inevitably owed much to others —to correspondents who have contributed suggestions, to the editors and proprietors of the *Model Railway News*, the *Model Railway Constructor* and the *Model Railroader* (U.S.A.) for notions which have sometimes been taken piecemeal and for diagrams and blocks which have been used. The opportunity is here taken of returning thanks to these invaluable sources. Many

friends on the author's mailing list have most willingly helped with photographs ; their identity will be obvious in conjunction with their contributions to these pages.

The steady growth of the craft of railway modelling is a matter for genuine gratification ; the writer can at all events claim some twenty-three thousand readers of his earlier books on the subject, and this is a by no means negligible public. To each of these and to all who so willingly join hands in this engrossing work greeting and sincere acknowledgements are now accorded.

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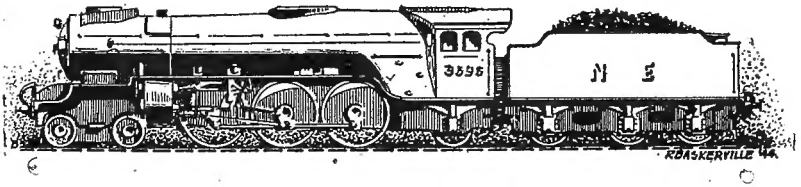
# THE NEW STANDARDS AND THE SMALL SCALES




## THE BRITISH RAILWAY MODELLING STANDARDS BUREAU

RAILWAY modelling in the smaller scales began in Britain some thirty-five to forty years ago through the enthusiasm and effort of a mere handful of workers. Prominent among them—to name no others—was Henry Greenly, upon whom there almost inevitably fell the task of setting up working standards for all the various scales down to O-Gauge. Mr. Greenly is an engineer by training and instinct, and his work was carried out exceedingly well, and it must be remembered that much of the credit of launching the craft on its course attaches to him and to his colleagues of that early period, who laboured under the handicap of lack of materials and resources such as we in normal times know nothing about. Some fifteen years later, the first Great War having intervened, a need was felt for even smaller standards than O-Gauge ; but whereas in 1909 there had been only a couple of men to standardise dimensions, when these smaller standards came into being there were scores of devotees and earnest inquirers all of whom felt qualified to set up their own rules. Standardisation of miniature scales must never be understood to consist merely of working down dimensions from the actual prototype to the proportions of the intended model. A much more important matter is that of the restricting influence of miniature operating conditions within which any fixed dimensions must be decided by experiment. If mistakes were made at this period, it is really marvellous that more errors than were made did not occur.

Certain standards, however, did emerge from the chaos of those years for HO-Gauge and OO-Gauge, and when these new

miniature scales were carried over to America—where the real interest only began some ten years ago—the American fraternity carefully avoided many dimensional pitfalls into which their British associates had become involved. They began by immediately setting up a kind of official authority to state categorically what dimensions should be adopted for all the different scales which were accepted in that country. It was a wise procedure in every way, and by its adoption the Americans avoided the anomaly arising when the products of one firm for a certain scale would not give working satisfaction along with the products of another firm. Unfortunately, this sorrowful conditions of things had become part of the landscape in Britain, and it was not long before there was felt an urgent need of something in the nature of inflexible standardisation in this country. The creation of such an authority in Great Britain is the most outstanding development in the craft during recent somewhat barren war years.

The American Bureau of Standards long since secured a firm establishment among the manufacturing firms across the water, so that it is now considered a privilege and an inseparable mark of qualification for such firms to use the insignia of the Bureau in their advertising. More or less strict uniformity has been the result. Scales of approved dimensions are laid down for all the track gauges which have been approved, and numerous other necessary rules and regulations have been decreed.

It was, of course, no easy matter to form such a Bureau in our own land, where the craft now numbered its devotees by thousands. By whose authority was it to be appointed and elected? How was the election of its members to be carried out? The answer to these questions was one which the writer, at all events, could not have provided, nor has he the faintest notion what methods were actually followed in the creation of this body. All he does know is that it was one day announced that such a Bureau had been formed, and that it consisted of the three editors of the three papers devoted to the railway modelling interest. A fourth member was at a later date added to the Bureau. The fortunate fact is that the members of this authority have proved thoroughly equal to their task; their findings have thus far brought general satisfaction to the people who make railway models. At the head of the Bureau is Mr. J. N. Maskelyne, A.I.Loco.E., than whom no more qualified expert could have been found. As editor of the *Model Railway News* and the *Model*

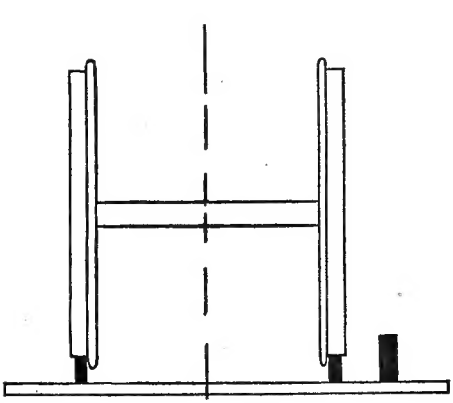
*Engineer*, President of the Stephenson Society, and a trained engineer and draughtsman, he possesses a thorough grasp of the principles at issue, both actual and model. Messrs. R. J. Raymond, editor of the *Model Railway Constructor*, G. H. Lake, editor of *Railways* (which conducts a small section devoted to model work), and F. W. Chubb, proprietor of the *Model Railway Constructor* and an accomplished authority on railway practice, are the three other members. The Bureau meets about once each month in a room loaned for the purpose by one of the British railway companies in London, and deals from time to time with the various scales. As dimensions and rules are agreed upon by experiment and codified they are published in these various periodicals. Those already fixed are set forth here and now so far as they touch the three smallest standard gauges. It is both natural to expect and gratifying to be assured that the British manufacturers will duly come into line.

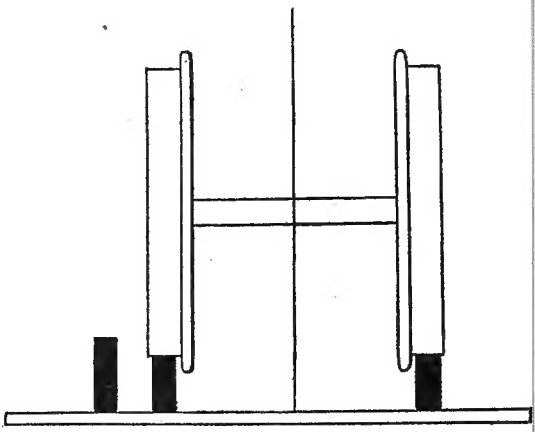
The Bureau wisely avoided the mistake of merely laying down lists of pedantically correct scale dimensions irrespective of other considerations, but realised that limitations of practice were as important as scale accuracy itself. Its aim, as officially stated, is (1) to draw up dimensions which will provide trouble-free operation, and (2) to labour for both correct and realistic appearance. As will be seen in the various tables given herewith, O-Gauge, OO-Gauge and HO-Gauge have been already dealt with. For O-Gauge, two grades of modelling have been approved —the " Coarse Standard " and the " Fine Standard," the former of the two adhering more or less to conditions already in use, the latter providing dimensions much more strictly to scale. OO-Gauge has also been given two forms—" Scale OO-Gauge " and " Standard OO-Gauge," the latter being much the same as the already prevailing classification. For " Scale OO-Gauge " a new track dimension has been fixed—that of 18 mm. between the rails. The well-known HO-Gauge was so near to scale accuracy that its standards required very little modification.

Under all these categories, track-spacing, six-foot ways, wheel-sizes, back-to-back wheel spacing and other important details are provided for, and it is a well-assured probability that when manufacturing again begins on a generous basis there will be an end to most of the troubles which have thus far laid in wait for the amateur.

From the standpoint of the present writer, there seems little to criticise in the various findings of the Bureau. From a practical

working aspect, the only faults he would venture to indicate are that the distance of the conductor-rail from the running-rail for the " Fine Standard " in O-Gauge seems somewhat unnecessarily excessive, and certainly the height of the conductor-rail above the running-rail in the smallest standards is unduly great. It is doubtful, indeed, whether for HO-Gauge, the stipulated height





| | Fine standard | Coarse standard |
|---|---|---|
| Scale | 7 mm. to 1 ft. | 7 mm. to 1 ft. |
| Gauge (straight track) | 32 mm. | 32 mm. |
| Rail height | 3.5 mm. | 7 mm. |
| Rail width | 1.5 mm. | 3 mm. |
| Flangeway (straight track) | 2 mm. (max.) | 3 mm. |
| Flangeway (curves) | 2.5 mm. (max.) | — |
| Flange thickness | 1 mm. | 1.5 mm. |
| Flange depth (sprung stock) | 1.25 mm. | — |
| Flange depth (unsprung stock) | 1.5 mm. | 2 mm. |
| Wheel thickness (total) | 3.5 mm. | 6 mm. |
| Wheels (back to back) | 29 mm. | 27 mm. |
| Sleeper sizes | 7 mm. × 63 mm. | 7 mm. × 76 mm. |
| Sleeper spacing (main line) | 18 mm. | — |
| Sleeper spacing (sidings, etc.) | 24 mm. | — |
| 6-ft. way (main line) | 80 mm. ct. to ct. | — |
| 6-ft. way (sidings) | 85 mm. ct. to ct. | — |
| Height of conductor rail (above running rail) | 2.5 mm. | — |
| Distance of conductor rail from running rail | 5 mm. | — |

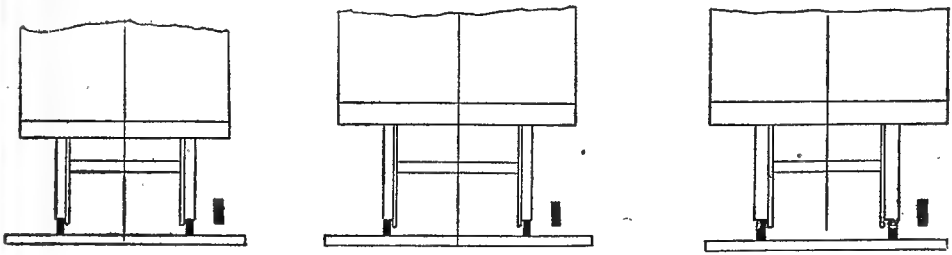
FIG. 1.—B.R.M.S.B. Standard Dimensions for O-Gauge

being the same as for the next two higher standards, the conductor-rail will satisfactorily clear the underside of the axle-boxes. Even in " Standard OO-Gauge " there will be inevitable trouble caused by the collectors fouling the frames of engines. But the dimension is intended mainly, no doubt, as a guide, and builders are free to follow the practical requirements of their working models in this particular instance. Certainly this dimension will not permit

of American locomotive model types being run on British or free-lance layouts, for on these models the heavier coupling gear and larger crossheads and lower slide bars will undoubtedly foul such a high conductor on curves if not on straight track.

## THE IMPROVEMENT OF SMALL-SCALE OPERATION

It has been alleged, not without a considerable basis of fact, that one of the most serious objections—probably the only serious



| | Scale "HO" | Scale "OO" | Standard "OO" |
|---|---|---|---|
| Scale | 3.5 mm. | 4.0 mm. | 4.0 mm. |
| Gauge (Straight) | 16.5 mm. | 18.0 mm. | 16.5 mm. |
| Rail height | 2.0 mm. | 2.0 mm. | 2.5 mm. |
| Rail width | .75 mm. | .75 mm. | 1.0 mm. |
| Distance between running and check rails | 1.5 mm.‡ | 1.5 mm.‡ | — |
| | 1.25 mm.* | 1.25 mm.* | — |
| Flange thickness | .5 mm.* | .5 mm.* | .5 mm.* |
| Flange depth | .75 mm.* | .75 mm.* | .75 mm.* |
| Overall wheel thickness | 2.0 mm. | 2.0 mm. | 2.5 mm. |
| Wheel back to back | 15.0 mm. | 16.5 mm. | 14.5 mm. |
| Sleeper sizes | 32×3.5 mm. | 36×4 mm. | 32×3.5 mm. |
| Sleepers on main lines | 9.0 mm.§ | 10.0 mm.§ | — |
| Sleepers on sidings | 10-12 mm.§ | 12-14 mm.§ | — |
| *Sleeper Thickness :—* | | | |
| Non-ballasted track | .76 mm. | .76 mm. | .76 mm. |
| Ballasted track | 2.0 mm. | 2.0 mm. | 2.0 mm. |
| *Standard 6-ft. way :—* | | | |
| Main line | 40.0 mm.§ | 45.0 mm.§ | 50.0 mm.§ |
| Sidings | 50.0 mm.§ | 50.0 mm.§ | 50.0 mm.§ |
| Height of conductor rail above running rail | 2.5 mm. | 2.5 mm. | 2.5 mm |

The radius of curves is measured from the inside edge of the outer rail.
The distance of the conductor rail from the running rail (centre to centre) is 4.0 mm. in each case.
* Max. † Straight. ‡ Curves. § Centre to centre.

FIG. 2.—B.R.M.S.B. Standards for 3.5 and 4 mm. Scales

one—to the adoption of the smallest gauges (OO and HO) is to be found in the difficulty of securing good running. As already hinted, there is enough truth in this charge to encourage the opponents of the standards to express the objection; but it is an objection which requires to be balanced by fair comparison and unbiassed experiment. It must be remembered that the

scales are new ones, comparatively ; and that precisely the same objection was brought against O-Gauge for many years after its inception. Another factor which has held up the progress of investigation into their possibilities has been the lack of financial interest put into their exploitation. The two most influential firms in Britain have always withheld, for reasons of their own, all support of scale modelling in these standards. One of these firms has developed a small scale system of its own, with eminent running success ; but had the enterprise and the finance that have gone in this direction been expended on scale modelling in this standard all these advantages would have befallen scale OO-Gauge. In place of this state of things, which would have been most desirable, the designing and marketing of components for scale work has been relegated in the main to a few firms, to whom the utmost credit is due, who have had to " make themselves " while making HO- and OO-Gauge models. These models have secured the enormous popularity they now enjoy entirely without the backing of capital or the advantages of any considerable advertising.

So far as these running troubles are concerned, it may be stated at once that none of them is more serious than the troubles accosted in O-Gauge when first it saw the light and was accounted far too small to be capable of satisfactory operation. It may honestly be claimed that the progress made within a space of ten years or twelve is equally as great as that shown by the firms dealing with O-Gauge during thirty years. Nor is the writer convinced that O-Gauge has much of an advantage in this matter of running even now ; this alleged deficiency of the smaller type has been enormously exaggerated. A highly responsible manufacturer recently insisted that he had never yet seen a OO-Gauge scale locomotive that would run without trouble for an hour. The writer may reply by stating that he has himself run these engines for months, consistently, without the slightest hitch, and that he possesses at least one such engine with a fourteen years' record of operation without any breakdown other than the need of new brushes after about three years of service.

One of the most serious mistakes, in which the writer shared, was a failure in earlier years to realise that decreased size in a locomotive did not necessarily sanction a decrease in voltage. A pardonable snag to become involved in, it will be granted ; and the writer many years ago discarded the normal 6-volts in favour of 8-volts. Further experience has shown that the

requirement is 12-volts, for it must be borne in mind that the same thickness of a dust-fall on OO-Gauge rails, the same amount of dirt and corrosion, will be doubly felt by a mechanism powered by half the customary O-Gauge voltage. The soiled surfaces are smaller; but so are the pick-up surfaces. Furthermore, there is a smaller allowance in the smaller scales for magnets in motors, which are of necessity permanent-magnets. It is therefore suggested to the Bureau of Standards that one of the earliest of its forthcoming stipulations might be that 12-volts should be the standard for HO and OO. And another item deserving of the emphasis of the Bureau is that for the detaching of the mechanism from the superstructure of the engine there should never be any requirement other than the turning of one screw or the pushing of a clip. Furthermore, another decree which would involve great convenience when Two-Rail becomes much more popular—as it will—is the inviolable law that motors should be so connected to the pick-up as to ensure forward movement when the right-hand running rail is the positive element.

Speaking of Two-Rail, there is no doubt that immediately the manufacturers are again launched upon their proper work there will be an enormous demand for lavish provision in the way of Two-Rail track, points, insulated wheels, locomotives and rolling stock. With regard to wheels, beyond doubt the best method of insulation is by the separation of the rim immediately under the tread. It is hoped, also, that there will be universal provision of *one standard of wheel only* for all OO-Gauge work, whether for engines or other stock. Diameters, the number of spokes and other details may vary with requirements, but the width of tread, the thickness and size of flange, never. For locomotive wheels there is needed a foolproof method of quartering and screwing these on their axles, which also should be universal. It ought never to be necessary to unsolder wheels from axles in order to dismantle a mechanism. More than half the running troubles in the smaller scales have been due to the difference in the size of wheels provided by different makers, each firm intent, no doubt, upon the adoption of its own suitable form of track. Before the war, no two firms were alike in their provision. It was not realised that the popularising of the craft by means of the abolition of snags was better for trade and better for all than the mere substitution of something claiming to be better for something alleged to be inferior. Through this oversight many hundreds of devotees have succumbed. And what has been written

of wheels can also be applied to track and to check-rail spacings, while there is also much need at this precise time for the total elimination of brass rail from the market in favour of nickel-silver. All argument on behalf of the former and against the latter is entirely redundant. Nickel looks correct, keeps cleaner, retains paint better, conducts better and works up into points more readily.

It is largely in the interests of the manufacturers themselves that the writer would also make the following suggestions regarding trade methods. It will always be inevitable, one supposes, that firms will themselves take one of three forms: there will be those who are essentially manufacturers, those who are essentially agents for all the others or most of them, and firms who combine both these activities. No doubt it is in the interests of enterprise and the progress of the craft that this should be so. But since the enlargement of the fraternity is the best of all blessings to the trade, a much closer co-operation between these firms for the future is indicated. It is all to the good that one firm should, as in former days, specialise in coaches or mechanisms or locomotive construction. But it does not seem entirely necessary that each separate firm should insist on bringing out into the market every form of equipment, good or bad, merely for the sake of "selling its own goods." The inclination to accept or to grant agencies for others' and their own products is a far better business proposition, and is far better for the public, than the duplicating of similar and often inferior manufactures. For a firm to make something attractive that other firms have not yet made, to make it the best way it can be made, or, failing this, to be stockists of the products of other houses—this method of doing business would be far more acceptable to the public, and far more profitable in the ultimate, than for the firms to keep bringing out irreconcilable components or cheap and inferior equipment. It is excellent to hear that the British manufacturers have recently formed a fraternity of their own with the object of standardising products.

## THE PURPOSE OF THE SCALES

There is an attractiveness peculiar to itself in O-Gauge, though its features are not always to be found where they are supposed to exist. Engineers who have worked on both O- and OO-Gauges will invariably agree that the one is no harder or more exacting than the other in its demands upon fingers, eyesight or machines.

For in scale O-Gauge models there will be a need of detail which does not emerge at all in the smaller standard. It is easier on the eyesight to produce an outline drawing of a locomotive in HO-scale than it is to produce a detailed drawing of an engine in O-Gauge. This does not signify that detail is not to be sought after in the lesser standards ; but the detail will, by its very nature, be less complete. One of the attractions about O-Gauge is the possibility of greater detail. Another fascinating item is that O-Gauge rolling stock is much more a matter for the woodworker's bench—if the builder has a gift for woodworking—than stock for smaller scales. But O-Gauge is outstanding in its attractiveness in that it will run where nothing else will run with such acceptance —on a garden layout with an indoor terminus. Similarly, O-Gauge lends greater scope to the artistic painting of locomotives and rolling stock in correct company colours, and adapts itself to a vastly increased voltage-power, so that much longer trains can be hauled by locomotives. It is therefore equally suited to a large indoor site where the emphasis is more concentrated upon engines and stock and accurate trackwork than upon the planning of a comprehensive and complete scenic system as such. Building equipment for O-Gauge is, for the greater part, a craft differing very widely from the building of smaller-scale equipment, and the pleasure of the owner of these respective scales is determined really by his peculiar craftsman's gifts. But in the planning and designing of equipment there is a perfectly close similarity.

There is an undiscovered phase of OO-Gauge modelling, a kind of unexplored country. Hitherto, almost every worker who has devoted himself to this and the HO-Gauge scale has done so in the first instance owing to the exigencies of space. He has found himself possessed of running rights within a somewhat constricted right of way and has thereupon decided, because of this, to adopt the smallest standard. Had he, on the other hand, found himself the owner of a good-sized room, he would no doubt have chosen O-Gauge. Supposing, however, that something like the opposite sort of thing were to become the rule. Possessed of a fairly commodious right of way, supposing the owner were to reason thus : " Here we are, with a really magnificent space at our disposal. Let us see what sort of a real layout is possible in the smallest standard." The writer humbly suggests that this is OO-Gauge in its true setting, and in a setting in which it has all too rarely found itself.

There are two separate and distinct functions in the miniature

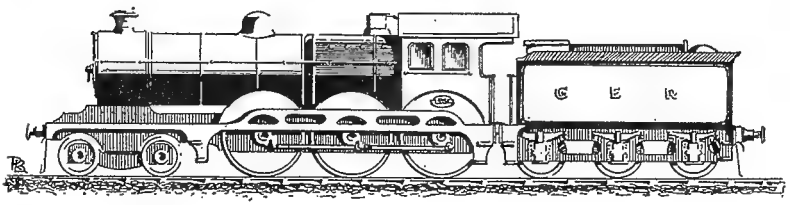
modelling standards known as HO and OO, two functions common to both. One of them is their adaptability to an extremely restricted space. In other words, they form the ideal 'table railway.' This was the purpose of the original designers who produced the commercial commodity known by that name. Their motive was to make possible in a small space exactly what O-Gauge had made possible, until then, in a larger space. But that was by no means the motive of those advocates of OO-Gauge who, even before the Table Railway was introduced, had been scheming and working to the same standards, or to similar ones. Many of these workers were by no means restricted in space, but they had found the accepted scales to be too large for comprehensive planning. And this is the second function of OO-Gauge, or HO-Gauge as the case may be.

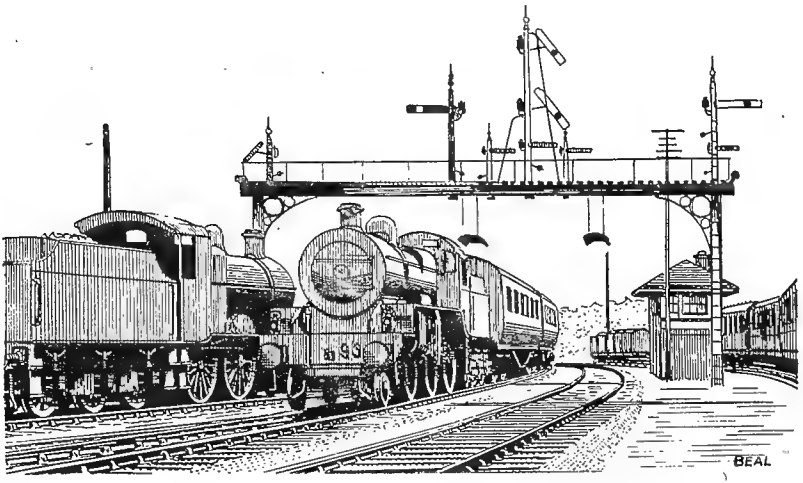
It was largely experience which led to this want on the part of the workers. They had been railway modellers for years, and had discovered what beginners only discover after a similar lapse of time—that even a large layout does not retain its charm indefinitely, and that a small one very quickly pales in its interest when once it nears completion. The beginner always tends to think he is planning for all eternity when he lays out his scheme ; but the veteran knows better ; he is aware that one layout, however good, can be improved upon when its errors have been learned, and he finds in rebuilding to better plans a greater pleasure than continuing to operate a layout in which he has found defects. It is impossible for the beginner to build the ideal system, for the simple reason that the ideal system is only developed by experiment. One learns to build by building, not by thinking or reading or discussing. Many early enthusiasts succumb because having operated their layout and having seen its faults, they stop at that point.

One is fully alive to the plight of many who have, at the moment, little space at their disposal. But one is also suspicious that, if these enthusiasts knew how much better a larger area can be they would strive harder to secure one. The deprivation can often be overcome by convincing those who share the home that the craft itself is more than a fad, and can indeed help to make a home what it is. Such a conclusive argument might lead to the acquisition of a larger room. Or, friends may club together in securing an adjacent garage or small vacant warehouse. If a reasonable location cannot be had for love or money, we advocate that it is often better to concentrate on the building

of stock, architectural features and equipment for the smaller scales until a better opportunity comes along. This, of course, is entirely a matter for personal decision.

Let it be emphasised, however, that this second function of the smallest scales is equally important and much more productive of interest and charm than the following of the notion that they are meant merely for doing in a small space the same thing as always has been done in the larger scales within a liberal space. The real function, we would say, of OO-Gauge and HO-Gauge is that of getting a more railway-like layout in a space which would permit only a skeleton run in the larger scales, the modelling of dock facilities, freight yards, passenger terminals, flying junctions, correctly graded inclines—features which were rightly accounted over-ambitious in their range in the old days when miniature scales did not exist.






## OPERATING ON TWO RAILS

RUNNING locomotive models on two rails does not need to be defended; it is the right method. It is the normal procedure which, because it was not investigated early enough, was passed over as impracticable because a third-rail was simpler. One wonders what snags and miseries might have been avoided if the early experimentors had stuck to the two-rail possibility and never given a thought to the third rail. We say that Two-Rail avoids this and that unseemly or unsightly thing, as if the unseemly and unsightly things were normal, whereas it is these things that are the interlopers. My friend Lieutenant Allan Lake Rice once remarked to me that it was "uncanny to see the little devils (referring to small-scale engines) running without a third rail." Which goes to show how investigation and experimentation in methods abnormal lead to the error of concluding that normal methods are extraordinary.

This bogey still exists in the mind of the average railway modeller with regard to two-rail power. Let it therefore be stated that it is the three-rail system that is fraught with difficulty, while the two-rail method is much more adaptable, natural,

less costly, less unsightly, less impracticable. It hasn't got any faults, and it hasn't got any snags. They are entirely imaginary. You save cost by eliminating the third rail and conductors—enough to pay for your insulated locomotives, though insulation is no extra expense to manufacturers—and you save the time and worry of laying a third rail. You save the short circuits between metal sleepers and conductor rail; you save the smashing of the projecting conductor at unsightly rail-ramps. You save three hundred per cent. of time whenever you clean the tracks. You improve the appearance of both your layout and your engines. You avoid the enormous worry of devising a type of pick-up that will both work and not need daily adjustment. You have no more trouble over insulation on track or locomotive than you have with the wrong method. You get better control, improved sectionalisation; and the setting of the points controls the current supply to the track your locomotive is to take. The sole item of mischief attaching to Two-Rail is that no one has ever really taken a large amount of trouble over working it out to a finish. When once this is done, three-rail for "steam" traction is a thing to be forgotten.

You can afford to forget three-rail, even though you want to run multiple-unit trains. For these are more often than not empowered by the overhead system; and if you don't want to instal an actual live system overhead, you can always arrange a dummy one and fit your electric coaches for two-rail like your locomotives. In fact, the only need that now exists for providing information regarding three-rail arises from the enormous number of misguided mortals like myself who have got it whether they want it or not. And this brings us back to the point where we started.

The first thing to be discussed, then, is track, how to make it and insulate it. At the time of writing one cannot buy the American commercial types, excellent as they are. For British users, again, the American tracks err in one vital matter—they invariably employ flat-bottomed rail. It therefore becomes us to make our own, either now or as soon as rail can be obtained. The writer has tested innumerable methods, and the one to be outlined is selected as the best and cheapest.

Turning to Fig. 3, we have a section showing spacing of rails and position of spikes. The best spikes are sold in America at the moment, and are made for the job. The section shows double track laid on one common batten $\frac{1}{2}$-in. thick, the dotted

line indicating the width of battens for single track. They should be 2-ft. long for a handy size, though this is optional. Take your batten, single or double track, draw a line for the position of all the sleeper ends, take a wood or metal distance piece to space them according to Bureau dimensions, and gluing the underside of the sleepers, lay them along the whole length. The plan in Fig. 3 indicates how the track will look completed. Next, you need a batten-gauge, that is a length of oak stripwood 16·5-mm. wide and $\frac{1}{4}$-in. thick. Pencil the position of the rails and lay this strip—18-ins. long—between the marks. Screw it securely in place with two screws through its holes. Then spike

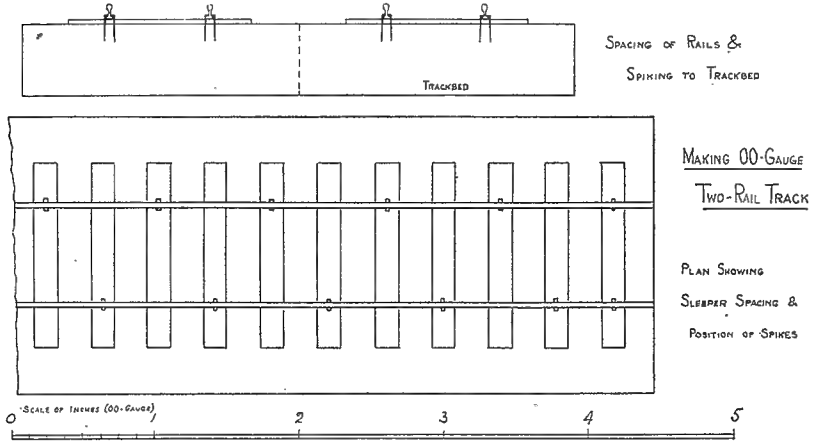



Fig. 3.—Spacing of Rails and position of Spikes for Two-Rail

a 2-ft. rail, outside only, close to the batten and through alternate cardboard sleepers. Repeat this process with the opposite rail. Now gently push the batten-gauge along, having first removed the screws, and as you push it spike down the inside of the rails. You can do your ballasting now, though you may prefer to do it before laying the rails. Paint the surface of the track batten with diluted glue, between the sleepers and all over the surface, mix some grit with the same glue and a little common soot to tone down the colour, and lay this over the glued surface. With certain forms of glue the powdered grit will adhere permanently if merely scattered on dry. A little testing of glue will be helpful ; hot glue will be better than cold.

If the ballast is put on dry, it can be shaken when the glue sets, to remove any surplus. The tops of the sleepers, of course,

should be left bare creosote. The type of batten suggested enables one to secure all the advantages of a track laid right down to the baseboard, while at the same time the battens can later, if desired, be bodily removed while the track remains intact. Even the point operators and cranks can be integral and will need no dismantling. As for the kind of wood to use for the battens, this is a matter for the builder to decide. The objection to using ordinary planed boards for the baseboard is necessarily eliminated, and as the battens are such narrow pieces probably a good plain soft board would be the best for the purpose. The scheme which naturally follows upon the laying of such battens is that no baseboard whatever is used for the layout ; the battens

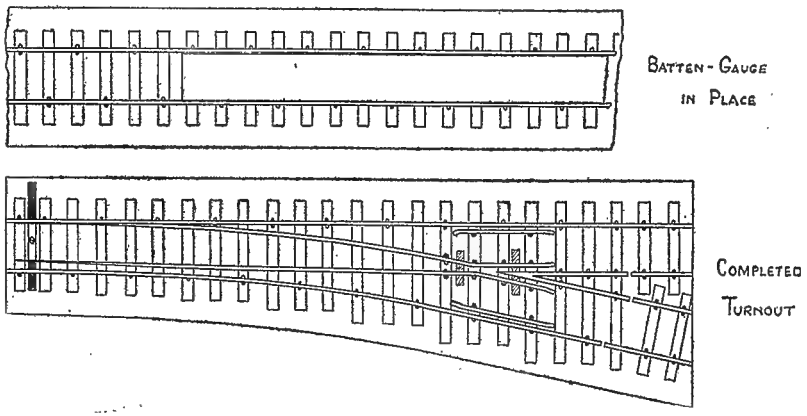



Fig. 4.—Two-Rail Track and Point

are simply laid first, with the entire track, all levels and gradients included, and the spaces afterwards filled or built up as shown in Fig. 7. This is the method stoutly advocated by our American cousins, who rarely indeed lay a table baseboard.

For the benefit of those who have not seen the Midlin type of track, a sketch of this is given. The idea is quite ingenious, since spikes are dispensed with, and the address of this firm is Midlin Models, Box 404, Scotch Plains, N.J. But of course at the present time this track cannot be exported to British buyers. (See Fig. 5.)

Some sketches are given in Fig. 6 which suggest methods of laying the Two-Rail track-bed sections as advocated in these notes, where the normal table baseboard is dispensed with. The first sketch shows the construction of the trestles and the reinforcement of the corners ; the second sketch gives the idea for

supporting various widths of the track-bed when they occur on a high level; the third drawing shows what to do when the one track crosses another at a different level.

When this system of up-building is employed, the only difficulty appears to be that of securing a method of finding foot-space on the surfacing for the purpose of repairs. No table surface being present, there is rarely a large space at the worker's disposal on which to stand. In the three sketches (Fig. 8) from the *Model Railroader* there are some useful ideas for getting over this trouble. A simple foot-bench may be used; or, again, for a different location, a wooden block covered with thick sponge-rubber on its underside may rest directly on the rail-surface without doing harm; or, thirdly, a pair of "horses" and a batten can be used for gaining access almost anywhere.

So much for plain straights. The question of curves is precisely similar. The battens will require to be cut to the radius of the curve required, single track or whatever it is, and a local joiner will do this work much better than an amateur. For the laying of the rails when the sleepers have been glued, as well as for the lining out for the sleeper ends, a curved template may be made to the requisite radius. Even a stout cardboard template is not to be despised.

The laying of a point is shown in Fig. 4. Here, again, the batten is specially shaped for the purpose; a number of these might be ordered or made together—they are all to one standard, and they will fit in at once with either curved or straight double or single battens. Several points should be noted regarding the turnout. One is the insulation of the point rod (which is simply a long sleeper having a tinplate strip riveted on—see Fig. 7), another is the cutting of the gaps in the two rails behind the frog—these rails need not be cut, but should be merely fitted after leaving the gaps; and another is the strengthening of the frog itself, and the provision of local conductivity by adding the short tinplate soldered sleepers as shown. The black spikes in the diagram indicate where the spikes themselves may be aided with a touch of solder. Switch-rails for the point are entirely normal. Spacing of check-rails in the drawing is according to the writer's own method, which has always been found to accommodate any type of wheel-spacing on the market—namely, 1/16-in. at the frog and 1-mm. at the outer rails. Bureau dimensions may be preferred.

Fig. 9 shows the method of forming battens to the shape of

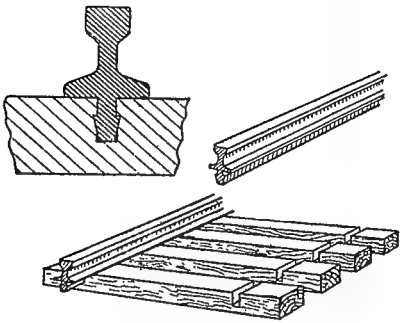


FIG. 5.—Midlin Track System

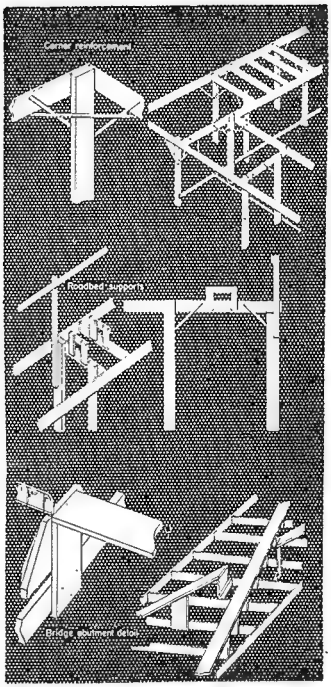


FIG. 6.—Laying Two-Rail Trackbed

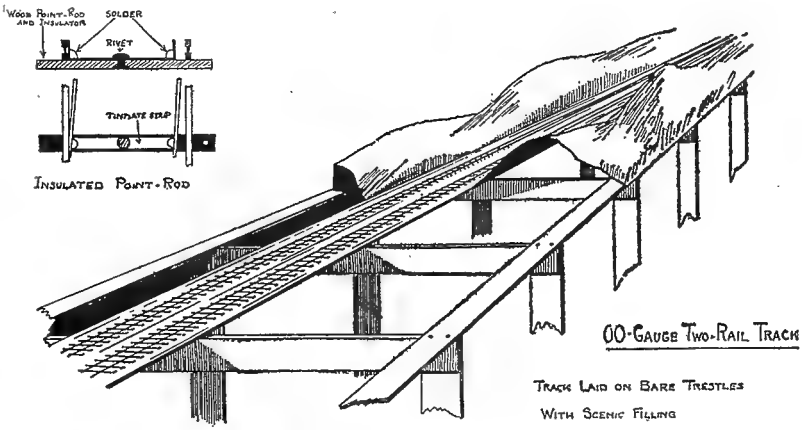



FIG. 7.—OO-Gauge Two-Rail Track

the respective set of points to be modelled. In Fig. 7 we have a sketch of the method of laying the track, with battens, as already

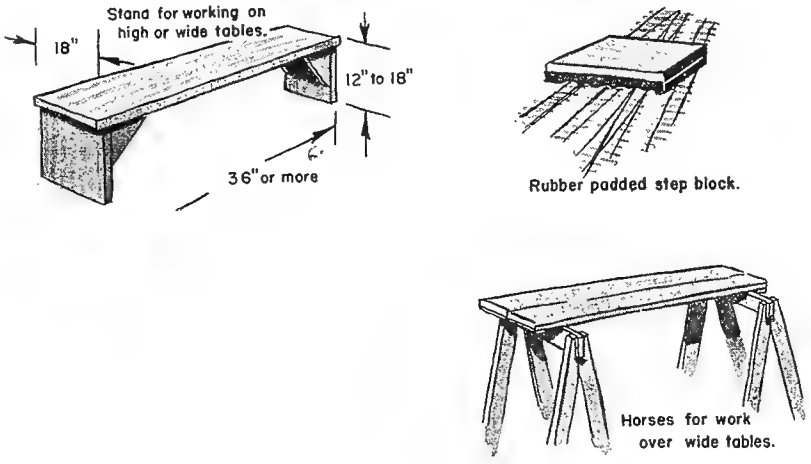



FIG. 8.—Ideas for Access to open-top Baseboard

touched upon, as well as a diagram clearly setting forth the method of making the insulated point-rods. The insulation of

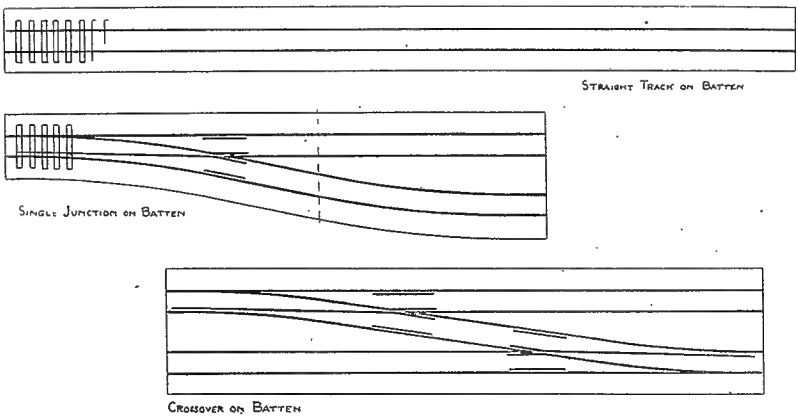



FIG. 9.—Forming Battens for Two-Rail

the switch-blades is highly important, since the whole of the current-direction depends upon it.

Passing on to the next drawing (Fig. 10), we have first the insulation of a common turnout. This is nothing new, and should

be quite familiar to anyone who has studied Two-Rail at all. In short, the moving of the point adjusts the energising of the necessary rails to give polarity to the road required. Wiring in the sketch is simply shown to indicate what is an integral piece ; it would not be necessary in the actual structure. A matter of prime importance is always to feed in the current at the *entrance* of the point, and never at its heel. In the same drawing a cross-over is also shown as insulated, this consisting of nothing more than a pair of turnouts. Up and down tracks can be separately controlled. With the diamond crossing, as the writer has already shown in his books, a simple double-throw-double-pole switch

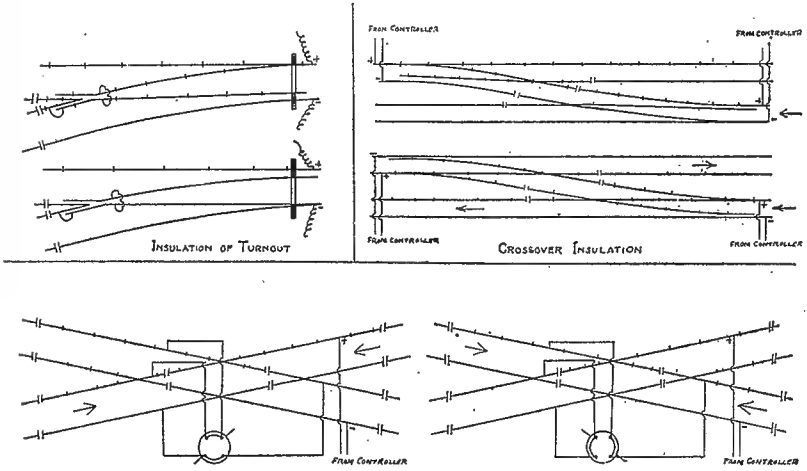



FIG. 10.—Two-Rail Insulation

is necessary to change the direction of travel and the consequent polarity. This switch is of course placed on the main panel.

A double junction (Fig. 11) is slightly more complex, and is something new, though indispensable on a considerable layout. In the drawing, arrangements have been made for changing the polarity with the same movement as that which changes the points. Note that the points work in unison with one movement of the point-lever. For the mechanism, one of Walther's " tierod switches " is employed—an admirable and cheap appliance. The heavy lines are positive, the lighter ones being negative, but it is important to observe that the polarity for either up or down track can be reversed at the controller at will, though this is only necessary for the emergency reversing of a given train.

Separate controllers are not necessary for the point section itself —a much larger section can be included. A simple scheme for the insulation of a double crossover, or scissors crossing, is given in Fig. 12 and appeared in the *Model Railway News* some time ago

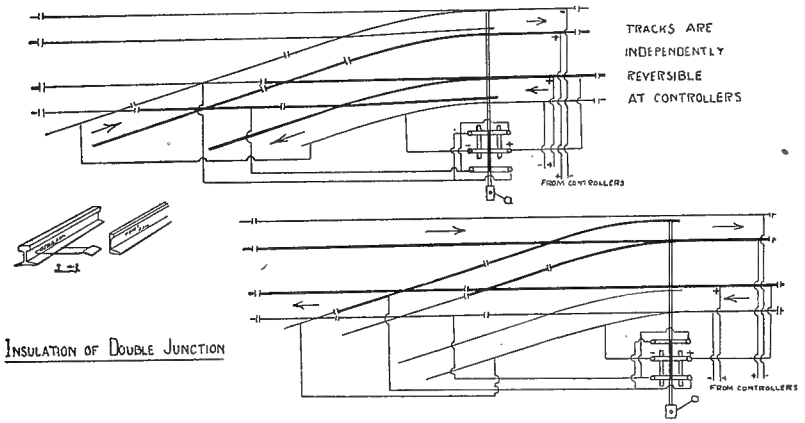



FIG. 11.—Insulation of Double Junction

from the pen of a contributor. It indicates the breakings of the rails and the electrical supply connections and incorporates the well-known method of using a couple of double-pole reverse switches, the points being separately operated.

One of the so-termed snags has always been thought to reside

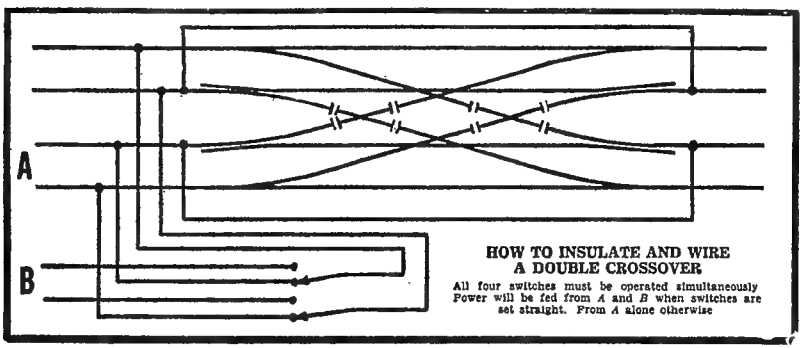
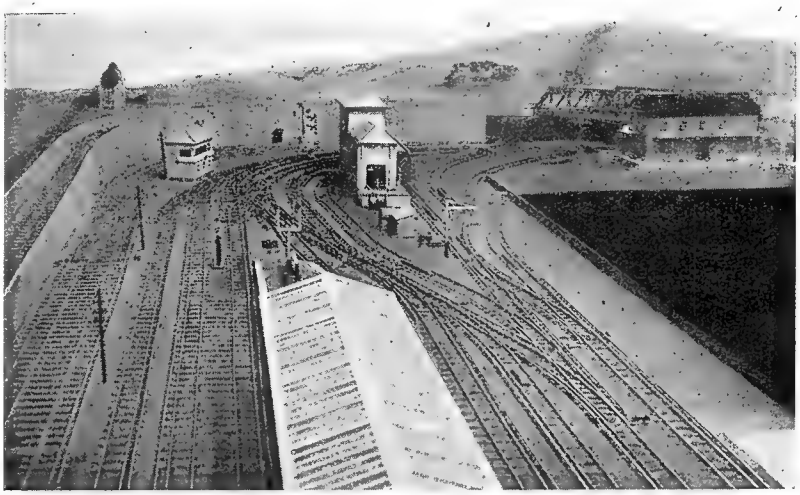

A
B
HOW TO INSULATE AND WIRE
A DOUBLE CROSSOVER
All four switches must be operated simultaneously
Power will be fed from A and B when switches are
set straight. From A alone otherwise

FIG. 12.—How to Insulate and Wire a Double Crossover

in the question of a single-track reverse loop. But there is really no difficulty here. Using the same tierod switch, the scheme is shown in Fig. 14, and is self-explanatory. One of the difficulties emphasised greatly by some advocates of Two-Rail is that of

the alleged uncertainty of contact when the switch-blades alone are depended upon for the manipulation or direction of the current, many of these writers having advocated the addition of a section switch to the point-rod in order to overcome this. Such a procedure seems only necessary if solenoids are employed without a spring movement. Most if not all British solenoids, and certainly the Walthers American one, have had this spring provided, whereby the point is positively locked when operated either way. But if the builder thinks it necessary he may attach



Three-Rail Track-Laying on Layout of Captain Fleetwood Shawe

to the point a small spring clip, for a sketch of which I am indebted to the *Model Railroader*, and which is shown in Fig. 11.

A further word may be written concerning loops. A single loop of the " reverse " kind is very likely to occur on any good-sized layout, but the builder is advised to avoid a double-track loop of this order if possible. Indeed, a double-track reverse loop is useless merely as a pair of loops—a single track loop serves exactly the same purpose. Consult Fig. 13. It will be seen that in the two loops marked (A) and (B), ignoring the dotted lines in (A) for the moment, the function is exactly the same, namely, to turn and reverse a train from the down to the up line. With a double track, this is all that occurs no matter which track is chosen by the down train. A double-track loop is only of value if the tracks indicated by the dotted lines, or others akin to them, are included. And yet another valid use for this contrivance

is shown in (D), where the inner and outer loops touch different parts of the landscape. But in all these instances, the loop idea can be discarded so far as the insulation is concerned, the point location being simply treated as an ordinary double junction.

In *Scale Railway Modelling To-day* a full scheme is given for the insulation and empowering of a Two-Rail double slip. But here, again, it is advisable to avoid this formation if possible, not because of the difficulties of insulation, but rather by reason of the nattiness of point construction involved. The sketch (C) shows how little real difference is made by using two plain crossovers—the slips give a mere saving of six inches in length.

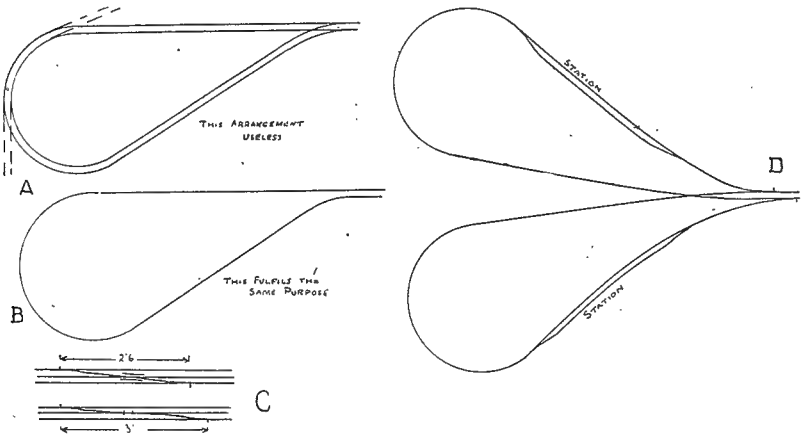



FIG. 13.—Utility and Futility of Loops

If this is found considerable, then the double slips might be attempted.

So much, then, for track. We now proceed to the matter of locomotives and rolling stock. It is a standard rule of the American Standards Bureau that for Two-Rail track, *the right-hand rail being positive gives forward movement* to locomotives, the power-supply to the armatures of motors being thus universally arranged. This avoids a vast amount of confusion, and is in every way desirable ; it has also been assumed as a condition in all the drawings here given. Note also another rule : that *the turning of a locomotive on the track, while it reverses the direction of the motor, does not reverse the direction of travel* for the engine ; see Fig. 15.

In the same Figure we have a number of matters relating

to wheel insulation. There are four methods of insulating wheels, just as there are numerous methods of insulating track, for Two-Rail. These methods are (1) by insulation of the hub and crank pins, (2) by insulation of the rims, (3) by using bakelite wheels and (4) by cutting axles and slipping on a right-fitting ebonite sleeve with an air-space in the centre. Without any doubt, for locomotives, the best of these methods is the second,

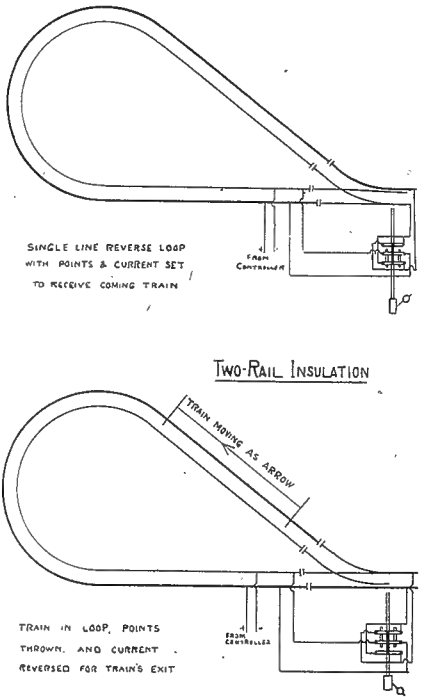



FIG. 14.—Insulating a Single-Track Loop

and such wheels, insulated at the rims, will again be obtainable when we reach a time that is normal. They could be bought in America as cheaply as any other wheels. For the actual empowering of the engine motor, if it be a tender locomotive, the best way is that shown in Fig. 15, where wheels are insulated throughout one side of the engine and throughout the opposite side of the tender, the positive lead coming from the frame of the locomotive and the negative from the frame of the tender. It is thus unnecessary to apply any sort of pickup from any of the wheel rims. Note the necessity, however, in this instance,

of insulating the tender from the engine, and also of insulating the couplers of the engine if all-metal rolling stock is to be used —as in the case of steel passenger coaches. A scheme for the insulation of the tender coupling is given in Fig. 16, and is very simple and effective.

But where there is no tender, what then? Here it is necessary to instal a small spring-shoe to engage the rim of one of the insulated wheels, and advisable to equip the bogie or pony-truck with insulated wheels throughout. The construction of this

Some Outstanding HO-Gauge Bridge Work by Mr J. B. Caldewell of Omaha, U.S.A.

spring brush is simplicity itself, a drawing being given in Fig. 16. The perspective sketch shows such a brush attached to a Varney shunting engine, as well as how to make the brush itself. It consists of a piece of wood or ebonite, a piece of spring, a rivet and a touch of solder. A still simpler method of fitting the brush with the aid of a metal plate is also indicated.

It is therefore surely obvious that this complicated insulation of locomotives for Two-Rail is not so complicated after all. But the advantages of running are enormous. For one thing, there is steady and unbroken electrical contact at all points and places. Again, there is increased contact, since all the

wheels have a chance of engaging the track together, the result being like that of using as many collecting shoes with three-rail as there are pairs of wheels on the two-rail engine. Added to

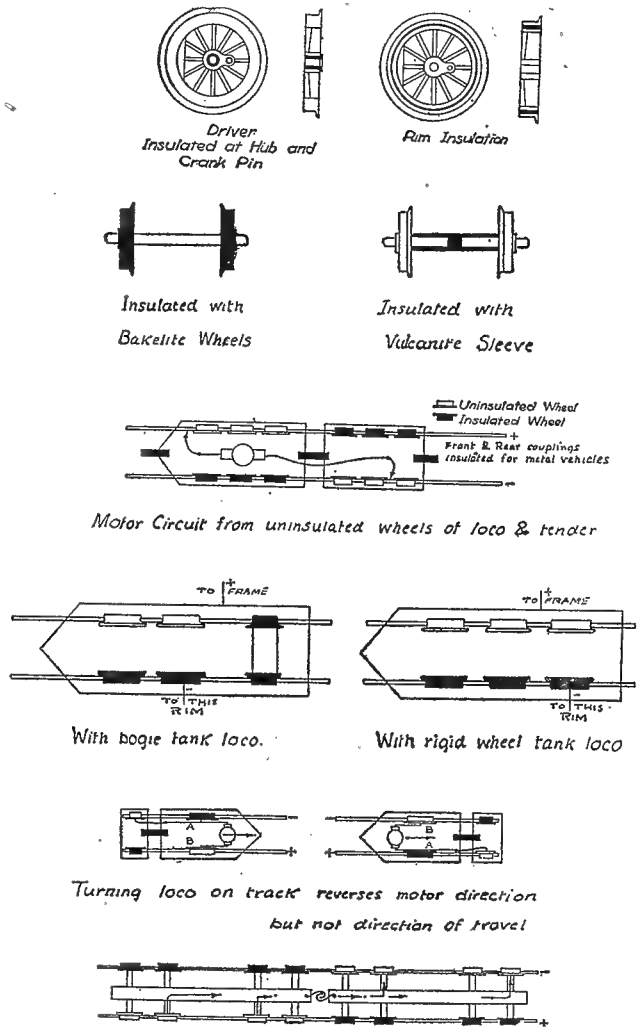

Driver
Insulated at Hub and Crank Pin
Rim Insulation
Insulated with Bakelite Wheels
Insulated with Vulcanite Sleeve
Uninsulated Wheel
Insulated Wheel
Front & Rear couplings insulated for metal vehicles
Motor Circuit from uninsulated wheels of loco & tender
TO FRAME
TO THIS RIM
With bogie tank loco.
With rigid wheel tank loco
A
B
Turning loco on track reverses motor direction but not direction of travel
Insulation of coaches for lighting.

FIG. 15.—Locomotive Insulation for Two-Rail

this and other advantages there is the final one of "seeing the little devils run on two rails."

A locomotive insulated for Two-Rail can of course be operated

also on three-rail track with a little adjustment. For the diagram which indicates this method (Fig. 17) I am indebted to the *Model Railroader*. With the use of a third-rail conductor for such an engine, it is desirable to avoid the obvious handicap of picking up the negative element merely from one of the running rails. For this purpose, one bogie on the tender and (if any) one bogie on the engine may be simply swung round, as the diagram, with its wiring for the collector-shoe, shows.

We pass on to the question of insulating wagons and coaching

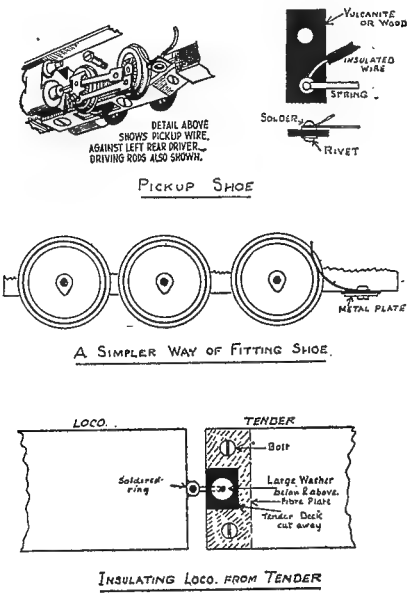



FIG. 16.—Locomotive Pickup from Rim and Insulated Tender Coupling

stock. For wagons, where the floors are of wood and there is no cross-bar as with a Runeezi chassis, the best method is that of the ebonite sleeve, or the insulated hub. All that is important is to be absolutely accurate in the cutting the lengths of the insulated rod to the exact back-to-back wheel spacing. For wagons other than of this type, including those with made-up Runeezi underframes, there is nothing for it but the bakelite wheels, and the installing of these ends all trouble.

There are two other subjects arising out of the Two-Rail System that may be mentioned. One of these is the lighting of trains ; and as the diagram (for which the writer is indebted to Mr. W. K. Walthers) shows (Fig. 15) this can be accomplished

very readily by using two coaches in the same manner as the engine and tender are used for power supply. The coaches must be insulated at the couplings (an easy matter if the Walthers Coupling is used), the frames of one coach given the positive, the other the negative.

Finally, there is the question of signalling of the automatic kind, known as track-circuiting. It was thought for a long period that with Two-Rail this was not possible, and indeed this was considered the solitary snag. The trouble was that (as with the original notion concerning lighting) when the current was switched out to stop the train in a given section, the power

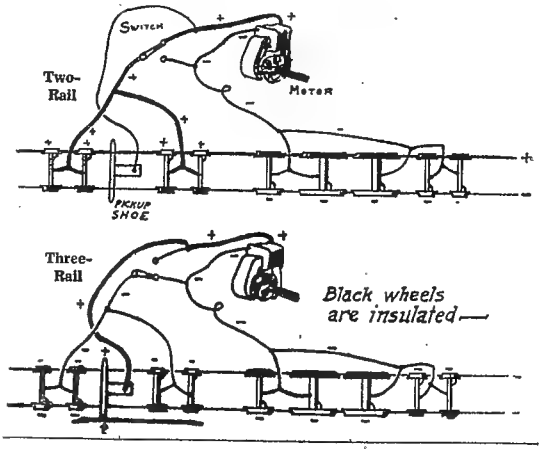



Fig. 17.—Using Two-Rail Loco. on Three-Rail Track

was also taken out of the signals and lights. So that, though there were a train in a section, standing still, no indication of the occupancy of that section could be accorded. This trouble has now been completely overcome by using a relay sensitive enough to operate on a flow of current less than that required to move the engine. Mr. Walthers recommends a relay with a one-half-ohm resistance, which will operate on three-tenths of an ampere.

## FRESH NOTIONS IN SMALL-SCALE PERMANENT WAY

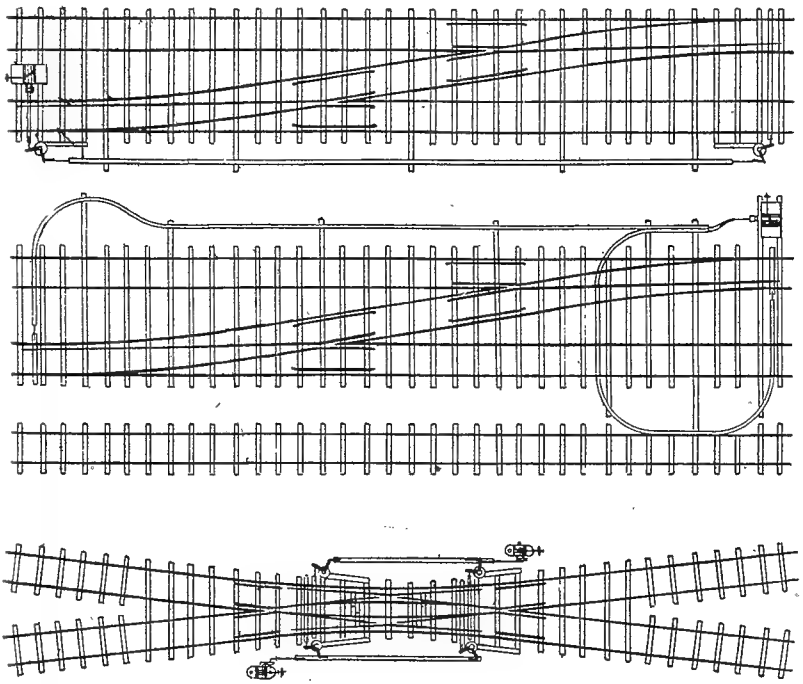
The reason why it is necessary and desirable to produce books from time to time dealing with the subject of railway modelling is that the craft is always developing and new methods

are continually being discovered as the result of experiment or the collaboration of ideas. There is little doubt that writing upon the subject is largely responsible for the perfecting of the Two-Rail system of power supply, and that, had such gathering up of research been possible in earlier years on a larger basis the third-rail system would never have secured its foothold before the natural and proper method had been thoroughly exploited. The same is also true of every branch of experiment and construction, and particularly does the statement apply to the work of track-laying. In this realm there have been quite numerous advances in recent years and months, and the purpose of this chapter is to gather up some of these notions for the benefit of beginners who have not yet become pledged to less satisfactory methods.

A scheme developed on the author's West Midland lines, in connection with existing three-rail track where the outside third-rail is used, is that of arranging the mechanism for point-operation integrally with the points themselves, so that subsequent lifting and removal of the entire point and its mechanism is possible. The scheme is shown in Fig 18 and is adaptable no matter what the method of point-operation may be, though it especially suits the use of angle-cranks for this small scale. The additional sleepers are simply sweated on to the existing tinplate or metal ones, and the cranks are sweated to the sleepers, care being taken not to solder the swivel of the crank. There is thus no need to pivot cranks into the soft baseboard when pulpwood is used. If the tubing and wire method of manipulation is employed the scheme is just as suitable, and the whole section of a crossover can be built up in one piece, mechanism and all.

While touching upon the tubing-with-wire system of operation, it is well worth noting that one American firm, the Midlin Model Co. of Scotch Plains, N.J., have put on the market a similar system of point control to this one, but using for the purpose the larger calibre of tubing as employed in the choke control of motor cars. The most acceptable part of this contrivance is the choke-plug itself, which provides a perfect method of operating the wire on the switchboard or similar location. A diagram of this method is shown. For O-Gauge layouts it would be well worth while after the war to import the entire contrivance, which is most robust in structure and involves no soldering work. A sample of this appliance was forwarded to the writer and it gave admirable results.

It happened that on the author's old West Midland layout there were a number of straight diamond crossings, very well made commercially. There arose at the same time on the new layout a demand for several new double turnouts which could not



*Above: Crossover with tube and crank integral control. Middle: Crossover with integral tube control and no cranks. Below: Double slip with integral cranks.*

*Attachments between point-levers and metal sleeper-strip.*

FIG. 18

be bought owing to the war. The engineering department was therefore compelled to work in the straight diamonds with the aid of exclusively standard points. This was so satisfactorily carried out that it is doubtful whether crossings with a curve will ever again be used for double junctions. A sketch of these

junctions is given. The single-track-to-double-track junction is such a sweetly-working mechanism as never to have caused a derailment. In every instance the main line junctions at a distance from the control-boards are operated electrically. At this particular set of points the control was somewhat complicated, for the setting of the single turnout required to be in accordance

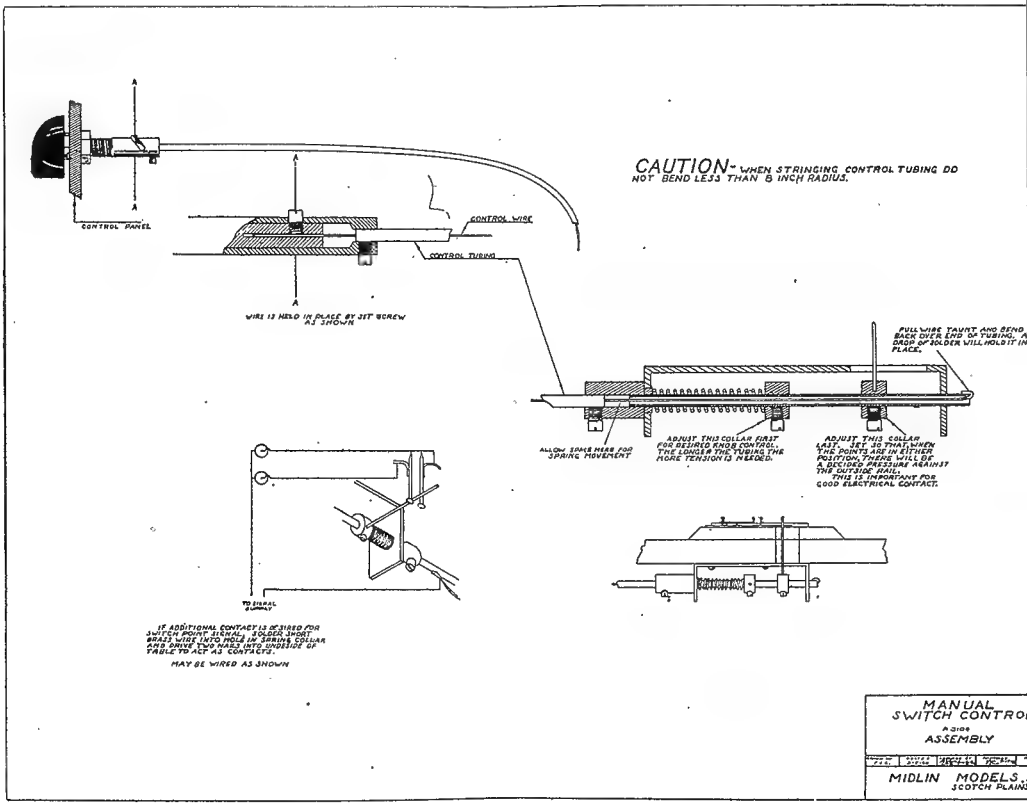

CAUTION- WHEN STRINGING CONTROL TUBING DO NOT BEND LESS THAN 6 INCH RADIUS.
CONTROL PANEL
CONTROL WIRE
CONTROL TUBING
WIRE IS HELD IN PLACE BY 3ST SCREW AS SHOWN
ALLOW SOME MESS FOR SPRING MOVEMENT
ADJUST THIS COLLAR FIRST FOR DESIRED KNOB CONTROL. THE LONGER THE TUBING THE MORE TENSION IS NEEDED.
ADJUST THIS COLLAR LAST. SET SO THAT WHEN THE POINTS ARE IN EITHER POSITION, THERE WILL BE A SECURE PRESSURE AGAINST THE OUTSIDE RAIL. THIS IS IMPORTANT FOR GOOD ELECTRICAL CONTACT.
IF ADDITIONAL CONTACTS IS REQUIRED FOR SWITCH POINT SIGNAL, SOLDER SHORT BRASS WIRE INTO HOLE IN SPRING COLLAR AND DRIVE TWO NAILS INTO UNDERSIDE OF TABLE TO ACT AS CONTACTS. MAY BE WIRED AS SHOWN
MANUAL SWITCH CONTRO
ASSEMBLY
MIDLIN MODELS

FIG. 19.—Midlin Manual Switch (or Point) Control

with that of the up or down main line points. This was accomplished by cranking the two adjacent (up and down) points to work simultaneously in opposition from one solenoid, and employing a second solenoid for the third point (single line) tuned in with the first solenoid. The two mechanisms are worked from a single push-button for one direction and a second push for the other. All solenoids, throughout the layout, are worked from the 16-volt supply secured by wiring straight

across both sets of batteries supplying split-potential current at 8-volts to the locomotives. I have not yet actually seen any solenoid on the market that will operate two points on 6 volts, excepting

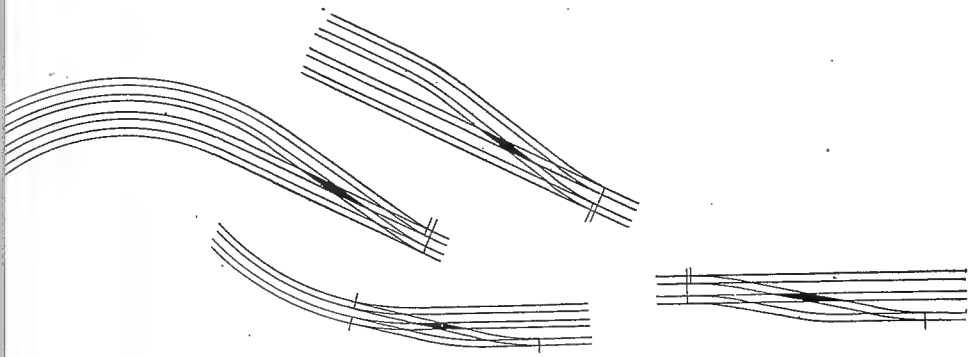


FIG. 20.—Using Plain Standard Diamonds for Junctions

a Walthers (U.S.A.) type. On the location I have just described, I succeeded in my first example of solenoid operation through the wire and tubing system.

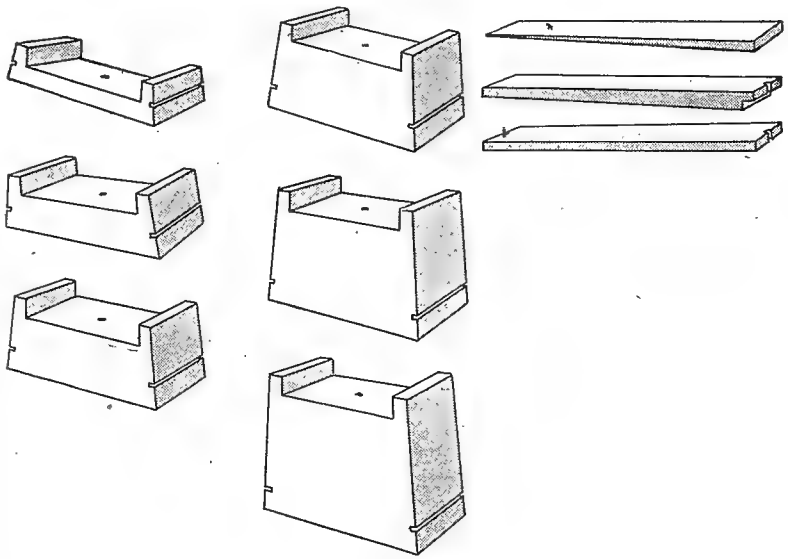


FIG. 21.—Trix Gradient Supports and Gradient Strip

A useful component which ought not to be overlooked by those who are at the stage of constructing gradients in the framework of a layout is to be had in the form of the gradient

supports which are a Trix product. Shaped in white mahogany wood, these fittings include a graduated series of under-bearing units together with standard sections of trackbed. The under-bearers are most useful where the gradient rises from a flat table-like formation-level, there being a series of six of these, ranging in height from 1 inch to $3\frac{1}{2}$ inches. The woodwork is finished to represent modern concrete construction and the trackbed is cut from similar material $\frac{1}{2}$ inch in thickness, each piece measuring $14\frac{1}{2}$ inches in length. The lengths are all $2\frac{1}{2}$ inches wide, the first section being tapered from zero to $\frac{1}{2}$ inch, the second bringing the tapered rise to 1 inch, and the third being a plain $\frac{1}{2}$-inch thick section. By arranging these strips with the

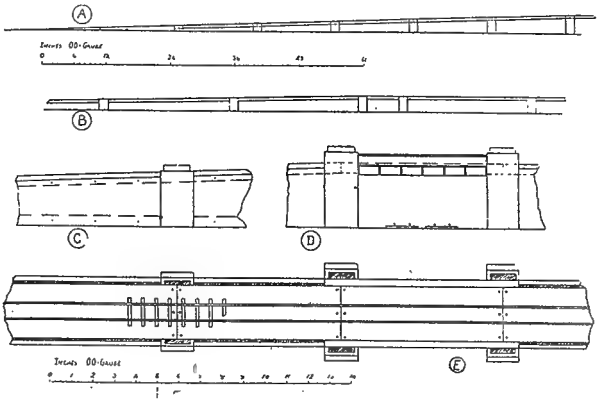



FIG. 22.—Scale Gradient from Adaptation of Trix Components

units beneath them, the whole fits up to form a gradient rising from datum to $3\frac{1}{2}$ inches, this gradient being to a ratio of 1 in 30, 8 feet 6 inches in length. Curves are provided for by specially curved trackbed pieces, though these, unfortunately, are of standard Trix radius, too sharp for scale usage. It is obvious, however, that shaped pieces could be cut by the builder himself to any desired radius.

The scheme will serve admirably as a foundation for a scale gradient even though 1 in 30 be too steep. In Fig. 22 I give a suggested elevation in diagram (A); in (B) will be found a scheme for using the under-units with similar home-produced trackbed of greater length—24 inches instead of $14\frac{1}{2}$ inches. This would give a standard rise of 1 in 40 and the same blocks could be used. To secure the scale head-clearance at bridges it would not be necessary to use more than five of the six blocks.

For the high-level continuance of the graded track the highest of the five blocks may be used in multiple. If it is desired to use the two Trix tapered lengths of track bed, this can be done, and thereby a further useful adjunct can be worked in from the commercial line.

In the sketches (C), (D) and (E) of Fig. 22 are given some further ideas. It will, for example, be at once found desirable to bank over the cavities beneath the track bed, and this may be done in two ways at least—either by fitting retaining walls or by adding the usual sloping "earth" banks. In (C) we have the former method. The track bed strips are simply duplicated and laid on the baseboard of the low level line, between the supporting blocks. This lower buttress may be the same width as the track bed, for perpendicular walls, or may be $\frac{1}{4}$-inch wider to provide for walls having the same slope as the outer face of the under-units. The wall itself, consisting of $\frac{1}{8}$-inch fretwood strips is tacked on to the edges of the inside supports and the track bed. The tops of the walls should not come quite so high as the top edge of the piers. If an additional embellishment is desired, a piece of $\frac{1}{8}$-inch square stripwood may be glued along the top of the piers. All this is shown in (E). In (D) we have a suggestion for a bridge with plate girders of fretwood and stripwood. The supporting units should be screwed from the underside of the baseboard, the services of an assistant being necessary to hold down the blocks in place whilst they are being screwed.

In the two sketches of Fig. 23 I have shown the two types of finished gradient. For the sloping bank type, the banks may be formed of either stiff brown paper, previously crumpled in the hands, or of medical lint. The top edge is glued and tacked along the surface of the track bed, drawn tight, and then tacked along the bottom edge to the base. Coated with glue-size and then surfaced with glue, grit and paint in the usual manner, the result should be admirable. The retaining wall type of filling should be acceptable for locations where space is limited, or where this special form of finish is demanded. Note the wing-walls on the banked type at the bridge.

By using only the first five of the series of six under-units a headway of $2\frac{1}{2}$ inches is secured, which is ample for all OO-Gauge structures. If the layout is HO-Gauge there is only need to use four of the blocks. Of course, blocks must be had in duplicate for the level continuance of the high-grade. Thus far, the

fittings allow for single track only, but no doubt double track will be provided for. The various fittings are extremely neat and well-finished.

It is already known to many workers that there is a right

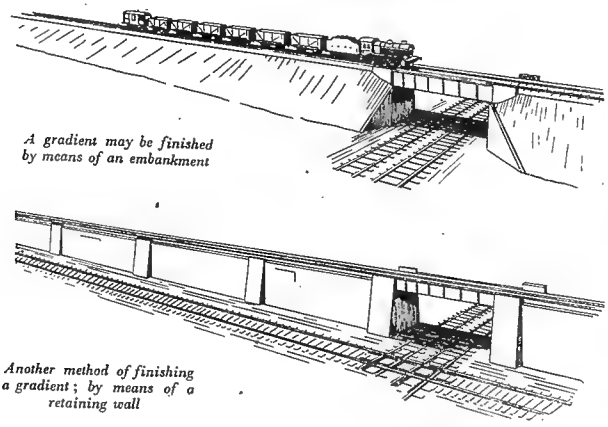



FIG. 23.—Finishing the Gradient Sides

and a wrong method of planning passing loops on a layout. For those who desire to proceed with strict accuracy in these matters there are given in Fig. 24 the right and wrong methods in diagram. (A) and (B) are both incorrect, for the arrangement

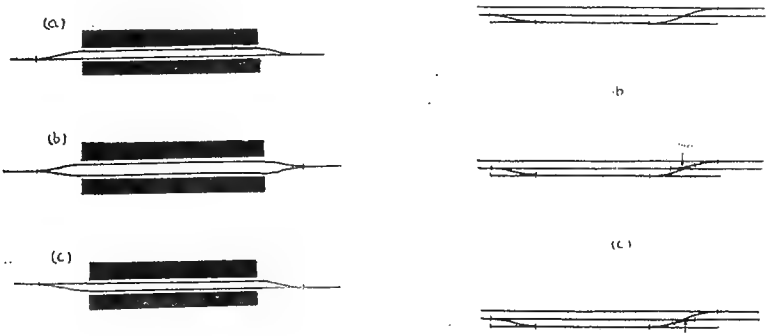



FIG. 24.—Right and Wrong Procedure at Loops and Sidings

is made without due observance of the placing of facing points. The correct scheme is in (C), since with this arrangement it is not necessary for any train passing in the normal direction to take a facing point. There is also a similar need of accuracy in the designing of sidings off a main line. Mr. H. D. Pinnington,

in a recent article in the *Model Railway News* has elucidated this matter, and I am indebted to him for the use of the sketches. A siding should not lead straight into the main line but should terminate in a shunting neck running parallel with the mains and joined thereto by a trailing crossover. It is also usual to have a second crossover facing the opposite way and leading across the down main (assuming that the sidings are on the down side) to the up main, which joins with trailing points. This crossover may cross the down main either by a plain diamond or by single slips. If the latter, they should be so arranged as to provide a trailing crossover between the up and down main. It is a mistake to place the slips the other way, as this would merely provide an extra outlet from the sidings to the down main and would involve facing points leading off the main

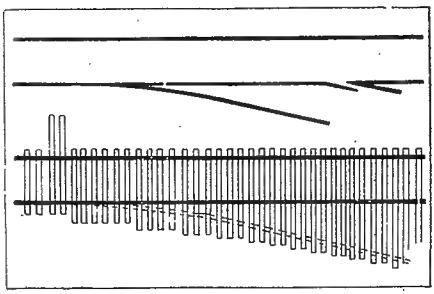


FIG. 25.—Leaving Provision for a Future Turnout

Fig. 24 makes this all clear ; (a) is the plain diamond arrangement ; (b) is an improvement ; but (c) is definitely wrong.

In these days it is well worth observing how economy can be practised in the laying of track generally, though indeed, at any time, such rules should be carefully exercised. To the *Model Railroader* I am indebted for the diagram showing how, in laying tracks, provision may be left for likely future turnouts. In this scheme, all that is required at a subsequent time to insert a turnout is to make a break in a piece of the inside rail and to swing it out to form the curve in the outside stock rail of the point. In order also to avoid the later need of laying the elongated sleepers for the point, these may be laid in the original instance, as illustrated. Another method is to go so far as to lay the straight point and the frog.

A friend of mine, in designing a terminus station, made numerous experiments to discover some of the snags which lie

in bad planning. His first scheme was that of Fig. 26 (A), which gives a very rough idea of his plan. In order to get the engine yard, turntable, coach head shunt and main entrance tracks linked up there were nineteen points involved, and the scheme appeared quite respectable. 1, 2, 3 and 4 are the main passenger platforms. Some further thought brought more light in the form of (B), where the number of points are reduced to fifteen and the traffic movements are precisely the same. Not

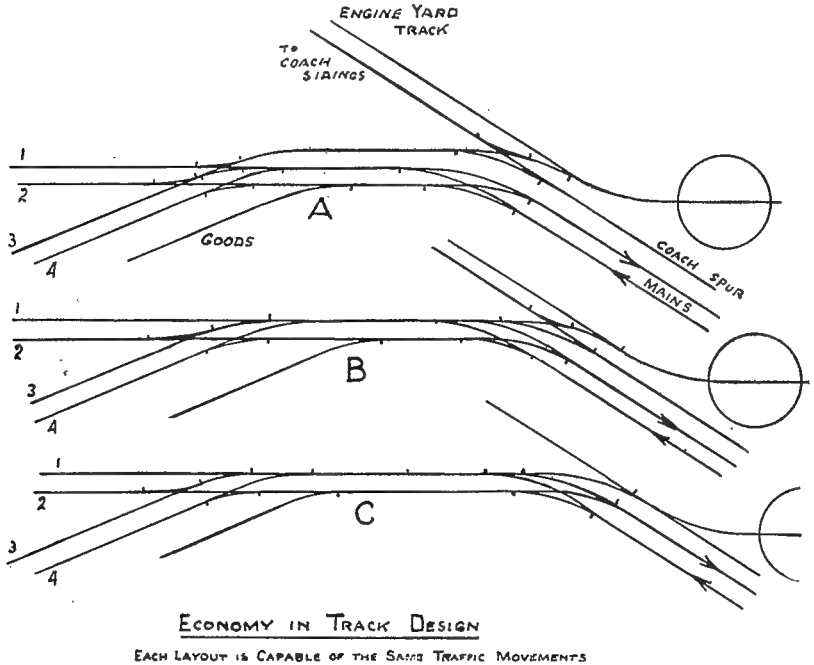



FIG. 26.—Economy in Track Design

content with this, my friend carried out further tests and found that the scheme of (C) was capable of just the same movements for traffic while reducing the number of points from nineteen to thirteen and eliminating a quite considerable amount of track. It goes without saying that on any station layout the expenditure of thought may as readily save the expenditure of cash, as well as serving to provide something much more railway-like in the finished appearance.

A great deal of the running trouble hitherto associated with crossings and points in the smaller scales can be averted by adopting the solid rail method of construction. Mr. Lloyd

Dubery recently presented in an article a useful sketch (Fig. 27) showing the simplest method of constructing these crossings, the same being applicable, of course, to any degree of angle. In

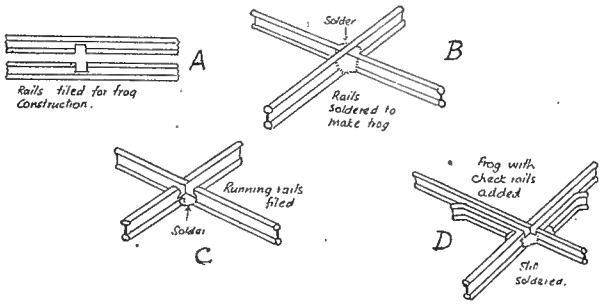



FIG. 27.—Solid Crossings

(A) we have the filing out of the niche at whatever point it is required, the dovetailed and soldered rails being shown in (B). In (C) we have the next step—the filing out of the solder to the exact depth of the flange clearance, and in (D) we have the

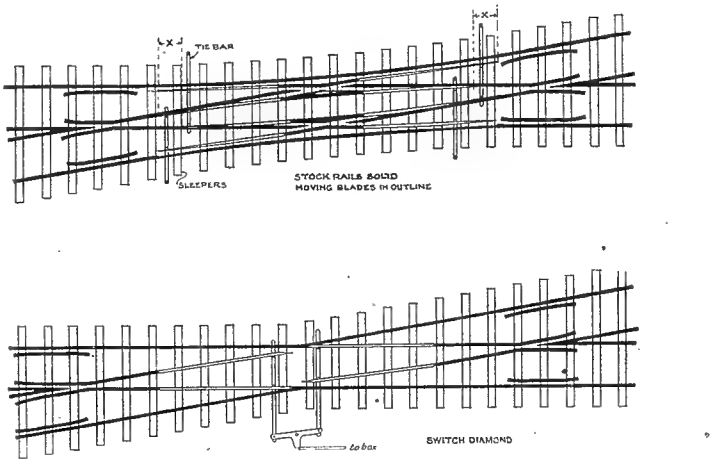



FIG. 28.—Standard Inside Double Slip and Switch Diamond

completed crossing. And while discussing this subject, it is well to mention the possibilities of the diamond crossing of the "switch" type illustrated in Fig. 28. This scheme only applies, of course, to acute-angle crossings, but it has been most successfully adopted on model layouts in connection with the

ordinary frogs of points. The little extra labour involved in the construction of such crossings and frogs would well be repaid in the total elimination of derailment troubles in all the scales from O-Gauge downwards. For the diagram of the switch diamond I am under obligation to the *Model Railway Constructor*, and take the opportunity also of including a further diagram equally well executed depicting a standard inside double slip point for the benefit of workers who may intend to build one up. In the case of a movable frog structure, it is worth mentioning that the controlling device could be linked up with the point-operating device on the same turnout.

## LAYOUT SCHEMES FOR RESTRICTED SPACES

The conditions of modern house design render it a desirable course to provide designs for layout planning that shall occupy as small a space as is compatible with the use of standard curves. What may be the standard of curves, of course, depends wholly upon the type of locomotive it is proposed to put into service. A modern Pacific express passenger engine requires curves of 3-feet radius in the 4-mm. scale, and 6-feet in O-Gauge. This means that if these motive power units are proposed the respective layouts will occupy a space with a minimum width of 6 feet 6 inches and (for O-Gauge) 12 feet 6 inches. There is no way out of this trouble other than (1) that of reducing the size of the engines, or (2) working to a scheme which dispenses with semi-circles in the track layout. Under the first heading it is quite possible and within sound practice to operate smaller locomotives of the 6-coupled type, and in fact there is much to be said in favour of these smaller models. I would rather possess and operate a model of a North London Railway 4-4-0 tank engine dating back in design to the 'seventies, which was given to me recently by its builder, than any Mikado or Pacific I have yet seen. And if tank engines alone are used, there will be no need of occupying space with turntables. But the commoner procedure is to work under the second heading and to use some form of layout in which the arrangement departs from the normal " station to station " order.

I am under obligation to Mr. W. F. Gentry for a very lavish supply of notes and some remarkable photographs descriptive of the HO-Gauge portable layout he has constructed within

a specially designed window seat. In other words, the complete and realistic railway model is laid down within a folding cabinet, built of ½-inch floorboards, which when not in use, closes up to form a padded settee 10 feet by 18 inches by 18 inches. When opened up the available space for the layout is 10 feet by 4 feet 6 inches, with a back-screen 18 inches high. Hinges carry the wiring between the sections of the baseboard. The sketches serve to show the structural design of the cabinet, the general plan, and the manner in which certain of the buildings fold

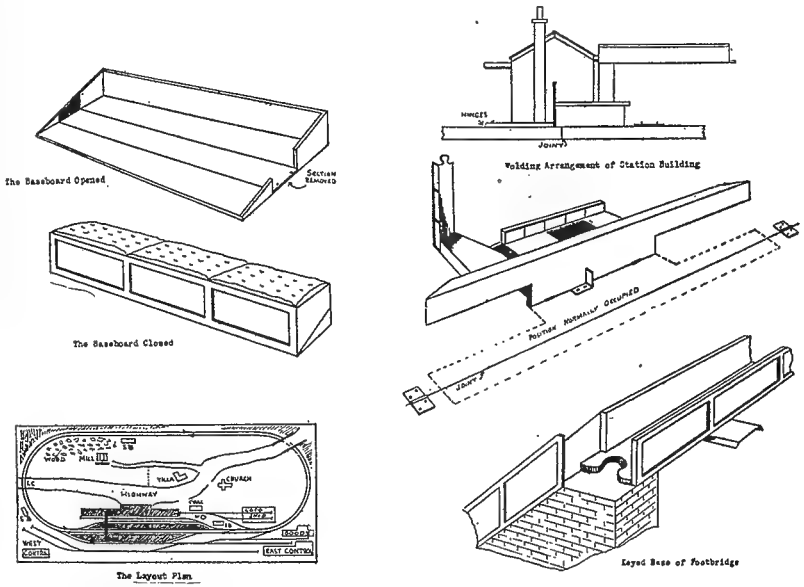
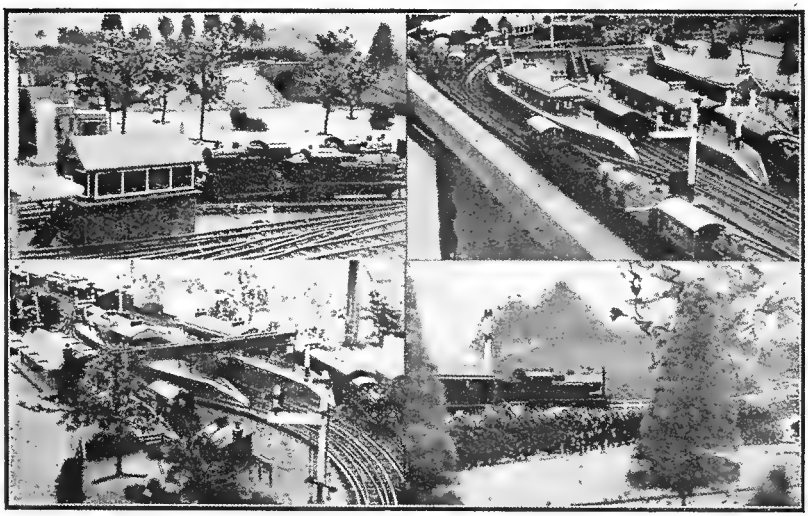



FIG. 29.—Details and Plan of the Pollards Hill Railway

over in the process of closing up the board. As only section (A) of the layout remains the right side up when both closed and open, this space is given over to the main fixtures of the system, and includes sufficient trackage to accommodate the whole of the rolling stock. As certain of the platforms are connected by a footbridge, this has to be made to divide at the centre, and has its floor cut in jig-saw style so that the two parts lock together.

The scenic work, as may be judged from the realism of the photos, is very complete. The line is entirely enclosed by fencing and hedges, with mileposts, gradient posts, track-circuiting signs, cable boxes, as well as the usual trackside equipment.

A miniature wood forms one of the striking features of the scenery, and is utilized for the function of breaking up the apparent continuity of the main line in much the same manner as a tunnel would do. There are about thirty trees planted in close formation. The back- and side-screens are painted to match the baseboard scenery. The signalling equipment includes sixteen semaphores, all automatically selected and operated by being placed in series with the trains, and the owner recommends this system for all who do not desire a manually operated scheme. Signals are returned to the " on " position by balance



Some Views on Mr Gentry's Folding Layout

weights in correct manner, and this avoids the flicking movement sometimes evident in magnetic devices. These weights are attached to the solenoid armatures by miniature chain as in real practice.

The track consists of Merco brass rail soldered to tinplate sleepers, loosely spiked through a ballast of thick dark grey tweed. The resilience thus obtained secures a very smooth sliding movement for the trains, which is too often absent from a rigid form of track. Nor is any trouble experienced by sleepers breaking away from the rails as a result of expansion and contraction, or due to the opening and closing of the cabinet.

Mr. Gentry has made remarkable use of the better type of Trix passenger coaches as produced by Bassett-Lowke Ltd.,

having furnished one of these internally and added roof and end details. Brake ends are fitted with tail lamps. A Hornby Dublo brake van (goods) has been effectively rebuilt with side lookouts, handrails, roof details and a third pair of wheels. The locomotive stud consists of eight various types, freelance design, all being tank engines or rebuilds, or built from Bing miniature engines. They are very detailed and carry dummy injectors, Westinghouse pumps, sanding gear, grills over the rear cab windows, full sets of lamp irons and works plates. Some of the later ones include mechanical lubricators, with oil-fed pipes, break gear, detachable headcode discs and equalised bogies. The latest addition is on sprung wheels. Trix

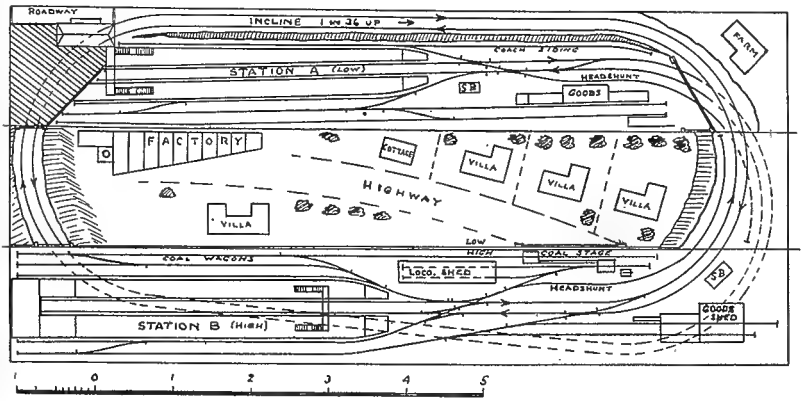



FIG. 30.—A More Comprehensive Plan for the Same Space

couplings are standard, with a correct pattern hook on the loco fronts to give a better appearance. Livery is black, lined with red, with gold numbering and lettering.

The little layout has been in constant use for three years without serious mishap or defect beyond two or three soldered track joints giving way. The entire thing was recently taken from London to Cheltenham by road, requiring to be lowered in two sections from an upper window. The total breakages were a third-rail joint and a sleeper joint ! The layout can be opened up for use in about three minutes and closed up again within a slightly shorter period without undue haste. The owner, I think, is warranted in recommending the scheme to all who live in homes where space is restricted.

For compactness of design it would be difficult to improve upon the Pollards Hill Railway just described ; yet it is worthy

of note that such a basic structure is not restricted to any one design. The same space and the same contrivance might serve to house layouts of entirely different types. In Fig. 30 will be found another scheme for the same dimensions, in which space has been found for a longer main line run, two terminus stations and two levels. The difficulty of arrangement involved in the two levels can be readily overcome by making the two movable sections in the sides of the cabinet integral with the two short pieces of baseboard carrying the tracks at these points. By this method, the track-sections concerned may be lifted bodily out of their place when the cabinet is folded, the pieces removed being laid inside along with other features in the

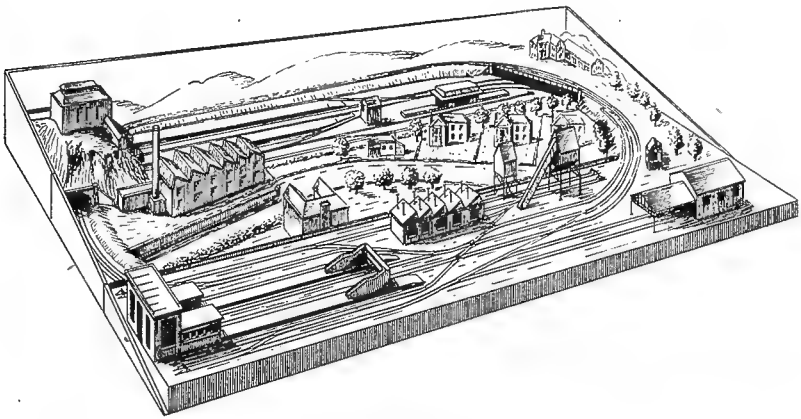
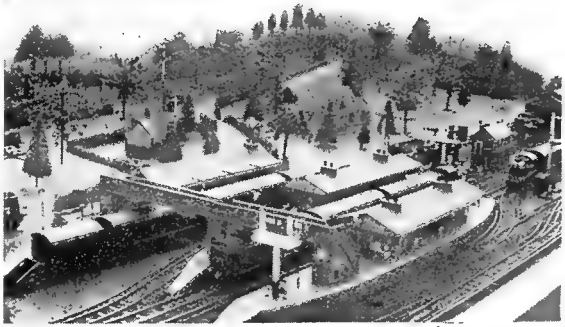
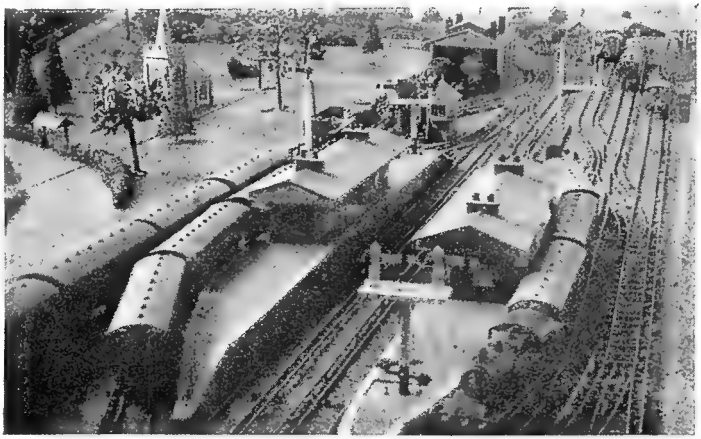


FIG. 31.—Perspective View of the Proposed Layout

form of buildings which are liable to clash with each other when the cabinet is closed. The entire trackage of both terminals and their environs are a definite fixture, with as many of the additional features as may find head clearance. The layout itself is quite interesting enough to give pleasure for a considerable time, after which, if no more space becomes available, it may be changed for another with very little labour and almost no further outlay for track. It should be observed that the curves allow only for small-type locomotives and that, since there are no turntables, these must be of the tank kind.

For those who work within the normal space-limits of a very small room, I know of nothing more admirable that has ever been created than the little Carlisle & Brampton Railway of Captain Fleetwood Shawe, who has kindly furnished me





Further Views on Mr Gentry's Pollards Hill Railway

with the plan which is now published for the first time. It will be a matter of interest that this layout was mapped out by the owner and the excellent plan drawn by him when he was about sixteen years of age. The room it occupies is one which would have been useless for any other purpose, and it will be agreed that no space has been wasted, while, on the other hand, there is no evidence whatever of ugliness or overcrowding. In a space measuring 9 feet 6 inches by 6 feet 6 inches Mr. Shawe

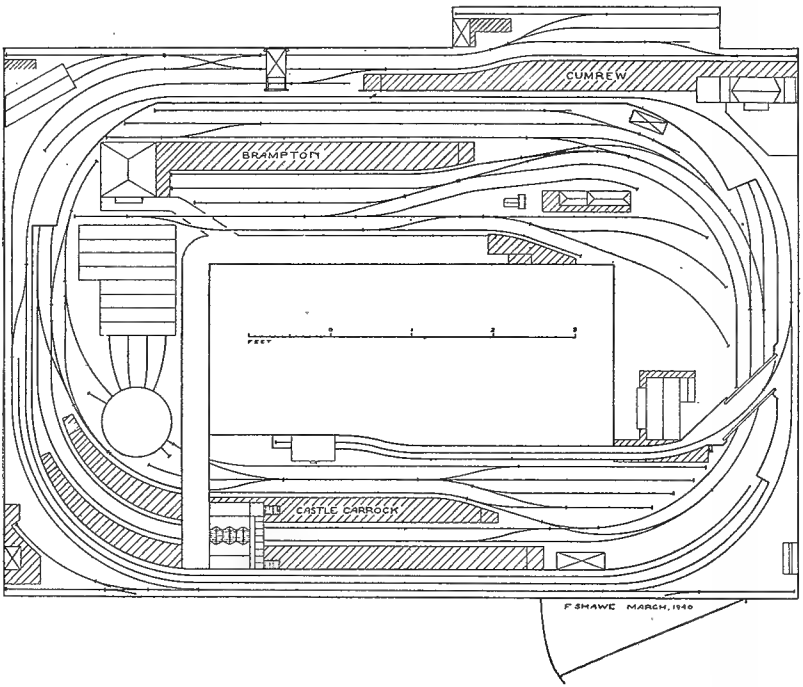



FIG.—32.—Capt. Fleetwood Shawe's OO-Gauge Layout

has produced a classic example of planning which is only surpassed by the excellence of every detail of the work that has gone into the creation. Working upon this system there is at least one heavy eight-coupled goods engine, which gives no trouble on the curves.

The Maybank Railway, the famous O-Gauge layout so often seen at exhibitions before the war, is shown in Fig. 33, the plan being that of Mr. Bowtle as it appeared in the *Model Railway News*. Here we have an entire departure from the usual; the layout includes a terminus station only, with a short length

of main line which deploys from the station into a tunnel. The latter houses an extensive traverser having four tracks which is entirely concealed by the high-level locomotive depot above it. The trains are assembled in the terminus and run to schedule, being either switched over for the return journey on the traverser or stored on one of its tracks until other trains have made their movements. The scheme, one of several similar expedients which have been designed for exhibition usage, is most ingenious. The somewhat steep ascent of the gradient to the locomotive

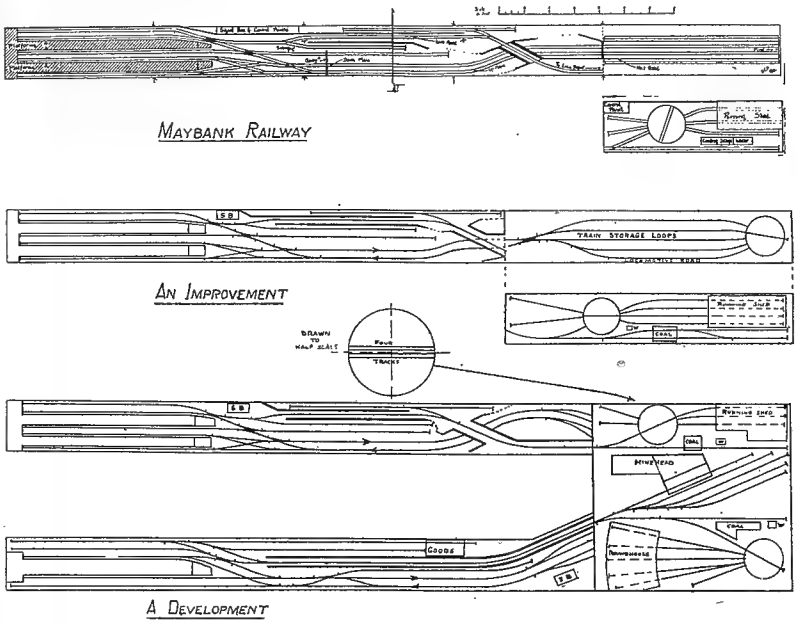



FIG. 33.—The Maybank O-Gauge Railway improved or developed

depot is mitigated by the fact that only light engines have to climb it. I could never quite shake off the conviction, however, that the layout would have been vastly better if, in place of the traverser—a difficult contrivance to operate, and one which surely involved a lot of "wrong way" working on the part of tender engines—had been replaced by a series of loop tracks in parallel, terminating at a small turntable on the extremity. Here, the engines of concealed trains could be turned and invisibly run back to the other end of trains before making their return trip into the terminus. Incidentally, by stealing only a little of the main line, ample space could be had for this

manœuvre and more space would have been at liberty for the engine yard. I have tried to make clear the idea of the alleged improvement in Fig. 33.

In Fig. 33, however, I give a developed scheme on somewhat similar lines to that of this deservedly famous model, in which double the trackage space is involved, though even this only amounts to about 30 feet by 7 feet. In place of the traverser or the loops this plan incorporates a large four-track turntable which is concealed beneath a high-level section containing engine depots and other features for both the termini. On the four-track turntable the trains are turned or partly turned bodily and may either run out to one of the termini or be stored for subsequent use. The turntable, in fact, fulfils all the functions of a double-track length of main line, and its movements for serving the stations in turn is one which is reduced to a minimum. This developed scheme lends admirable scope for two operators, while the space between the stations is ample for these workers and visiting onlookers.

## A MORE AMBITIOUS PROJECT

In Fig. 34 there is a suggestion for a layout on really ambitious and somewhat novel lines and one in which an effort has been made to include some fresh and useful operating ideas.

One new idea in this layout is that of a divisional centre for locomotives. This is simply a replica of real practice. It is a common procedure to instal a single large-capacity engine terminal some distance away from all stations but centrally located between several. This is also a particularly convenient procedure on a modelled layout. Sometimes in real practice the divisional centre is situated at a distance of fully ten miles from any large traffic centre ; but always the motive is that of greater accessibility for power units, and the reduction of total engine mileage. That is, by this arrangement important centres are brought within equidistant reach. Such a centre is included in the suggested layout.

Another innovation is that of the tunnelled section which conceals quadruple tracks providing passing or waiting sidings for main line trains. By this means, slow trains can be overtaken by fast trains, and a considerable length of main-line journey may be simulated. There is a large hump marshalling yard—one of the

most fascinating features of any model layout, and one which is impossible when a larger scale or a smaller space is adopted. There is also a most useful and effective section of parallel track on which excellent demonstration runs can be made. On the east side there is a section of track arranged at a very large-radius curvature which will also be found effective. At the circular loop tunnels, provision has been made for easy access to trains. When tunnelled points occur, there are two sections

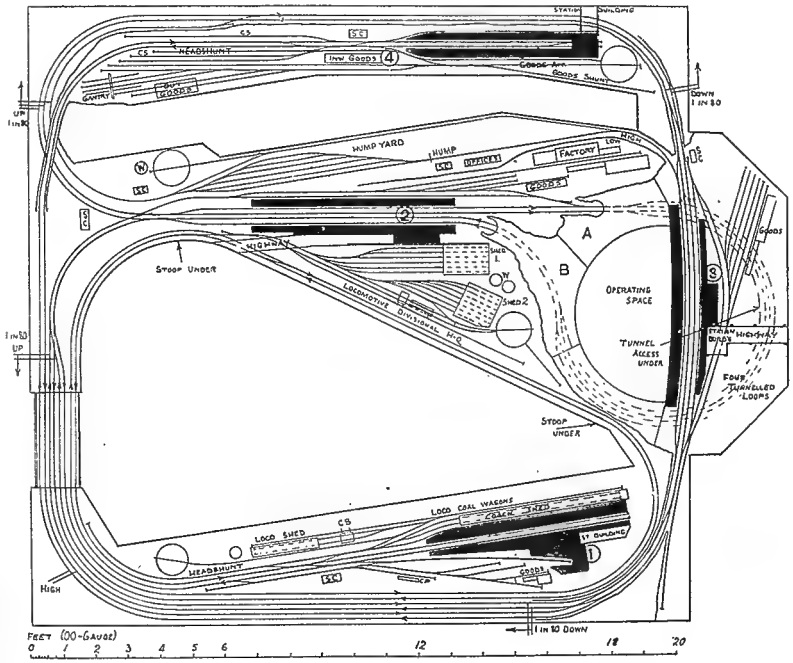



FIG. 34.—A Design for a Comprehensive System in a Large Location

(A and B) of the hill above which are arranged to lift out. All coach movements, shunting, and so forth are correctly provided for. In the entire layout there is only one slip-point, to the west of Station 2, while the main line of the system allows for point-to-point running with a continuous loop, the whole layout being double-track. The lifting section by the doorway is quite unimpeded and may consist of any type of lift-bridge, or even a lift-out plain board. In the latter instance it would be desirable to arrange a couple of brackets below the baseboard on which to place the section when it is removed.

In Fig. 35 I give a plan of the proposed locomotive centre. The sheds will house thirteen locomotives, each one in an integral and independent stall—a definite advantage on a model layout, which dispenses with the need of "spotting" engines, or removing one unit in order to bring out another from the shed. The sheds themselves have ample track frontage for the inspection and display of the stud. Small crosses indicate lamp or flood-light standards. The turntable is entirely independent of shed approaches and exits. Water softening plant is on the offside of the yard, and there are standpipes between all locomotive tracks.

The entire layout involves about 1,000 feet of track, and

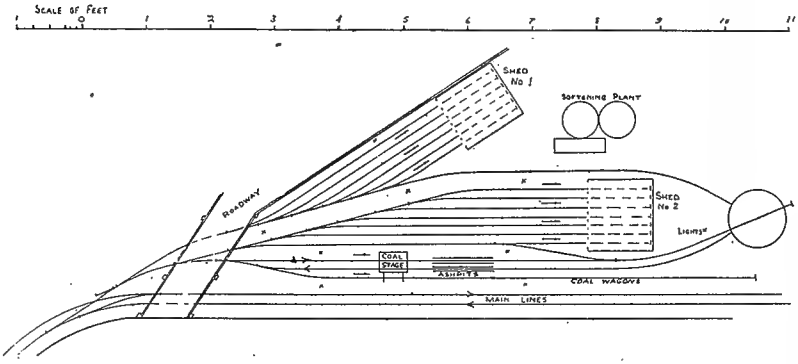



FIG. 35.—The Divisional Locomotive Centre

there are 95 points. This amount is not to be thought excessive, being not very greatly in excess of the "mileage" of the West Midland Lines. It should be borne in mind that "OO" gauge track is cheap and forms the very best of all railway modelling investments.

## A FABRICATED LAYOUT

In *Scale Railway Modelling To-day* I have dwelt upon several schemes with a view to overcoming the shortage of space in modern houses or in order to meet the demands of men of nomadic circumstances. In this chapter I propose to describe yet another, and, I think, better system—that of the fabricated layout.

By this is implied the construction, piece by piece, of a couple

of terminal baseboards, with their respective layouts, which shall of themselves be applicable to an unlimited variety of possible sites. By the adoption of these two isolated baseboards, the planning of the layout in general may take one of many forms. The pair may, for instance, be located within a single room, and might occupy the two lengthier walls ; they may be arranged within one room at right-angles to each other ; they may occupy central positions in a single room ; or, one of the baseboards may abut upon the wall while the other occupies the centre. On the other hand, if the rooms are more than one,

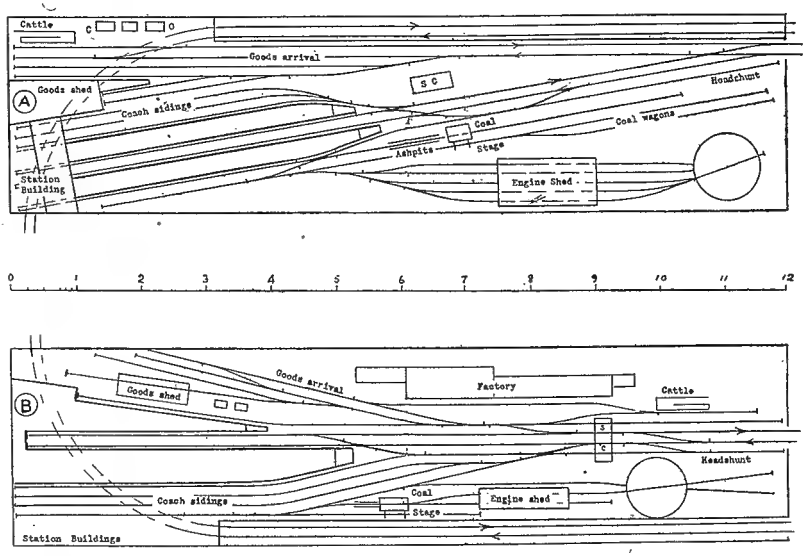



FIG. 36.—Station Designs for a Fabricated Railway

even though the space for both is restricted by reason of other domestic features, the terminals may be placed as far away from each other in actual feet as seems desirable ; the intervening passage or landing space being utilised for the main line. A very valuable feature of the system is that, in different houses the owner may from time to time occupy, any of the various schemes may be chosen one after another.

We will first deal with the two layouts of the termini which are shown in Fig 36, and are labelled (A) and (B). They are identical in size, and their respective baseboards are identical in structure. That is to say, although the curved tracks of the tunnelled sections are in opposed directions, the building of

the baseboards is in every respect identical. Terminus A is the larger of the two. It has, within a space of 12 feet by 3 feet, a passenger station with two arrival and two departure platforms, a couple of coach sidings, and an overhead concourse. There is also a very convenient goods depot, with freight shed, cattle pen and coal offices, together with the usual arrival and departure tracks for goods traffic. Passenger facilities also include a workable headshunt for the transference of coaches from one track to another. At the locomotive depot there is a running shed for four full-length engines, a turntable independent of shed

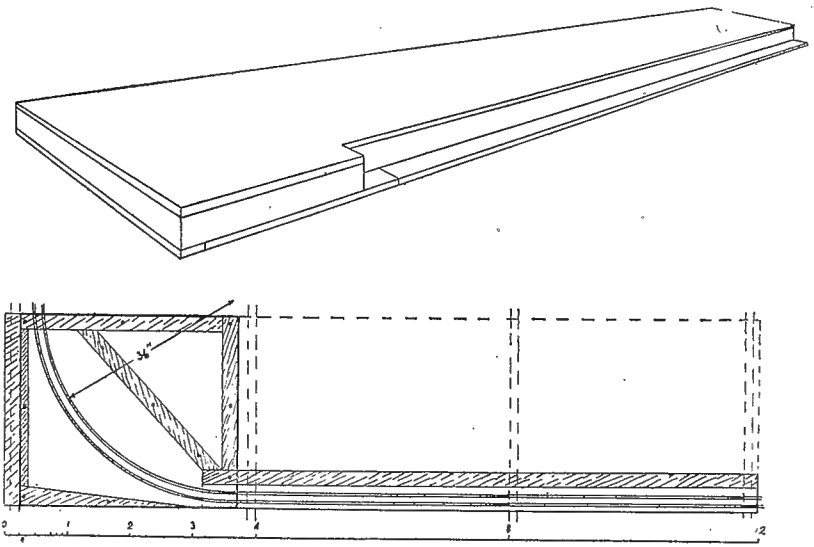


FIG. 37.—The Baseboards, Identical for Each Station

movements, and a coaling stage with coal-wagon tracks. Terminus B has three passenger platforms, a milk bay, and coach sidings, goods arrangements being ample and convenient. Here the locomotive depot is smaller, being capable of taking two larger-type units or four tank engines. All passenger tracks will accommodate four-or five-coach trains. At B there is also a commodious factory and a signal cabin of the track-spanning type.

The tunnelled tracks for the benefit of the main line are also shown, and this brings us to a description of the baseboards. In Fig. 37 will be found a perspective sketch of one of these, minus all the tracks, and the scheme will be clearly discernible. The outer walling of the edges is not indicated, but would consist

simply of, say, 4-inch by ¼-inch planed whitewood strip tacked on, forming both a cover for the battens and surface edging and a dwarf wall rising an inch or so above the formation level. In the sectional plan, Fig. 37, there will be seen a method of arranging to have the inaccessible portion of the tunnelled tracks easily detachable for cleaning, this being absolutely essential. The dotted lines around the extreme edge show the position of the top surface, Treetex or other pulpwood being recommended. The shaded portions show the supporting battens between high and low levels. Additional battens are also required beneath the pulpwood top where there is no tunnel. Heavy black lines indicate the removable section of under-floor where there occur the curved roads. Dotted lines across the baseboards suggest the position of the trestle tops, so spaced as to allow the tunnel base to be dropped by merely removing a few screws. The form of trestle used falls to the choice of the builder, but that described in *Scale Railway Modelling To-day* will, with a few cross-battens, adequately suffice. The minimum head-clearance for the tunnels should be 2⅜ inches, and the curve radius allowed is 3 feet minimum, the scale being that of OO-Gauge.

We will now proceed to Fig 38 where there are shown a variety of possible arrangements of the layouts. In (1) we have a scheme for a single room 15 feet by 9 feet. The tracks are in every case double throughout. This first layout has the track-crossings on the level, and to secure this it might be necessary to grade the open portions of main line tracks on the baseboard sections. Scheme (2) requires one room only 15 feet by 11 feet 6 inches, and conveniently manages to avoid any level crossings of the tracks. Running facilities of the main lines are much more elaborate and interesting here, a continuous route in each direction being incorporated. The scheme of (3) is still more developed, the size of the room being 15 feet square, the main lines having both graded and level crossings. But passing on to (4) we see the two termini adapted for use in two rooms separated at some distance from one another. A very attractive main line is here possible within an extremely limited space width, dimensions of the available rooms being only 12 feet by 7 feet. The idea of (5) involves only one room of small proportions, the main lines being carried outside it to any desirable or possible distance. Some further variations are given in (6) where the terminus boards are laid in the form of an " L " and the main lines are as simple as they may well be.

It would of course be possible to multiply designs without limit, and the exercise of a little ingenuity on the builder's part will doubtless lead to other possible courses. In certain instances, the outer portion of the main lines on the terminus baseboards must be graded in order to make suitable crossings. In other cases they will have to be level. A further distinct advantage of the scheme is that work can be started at any time on one

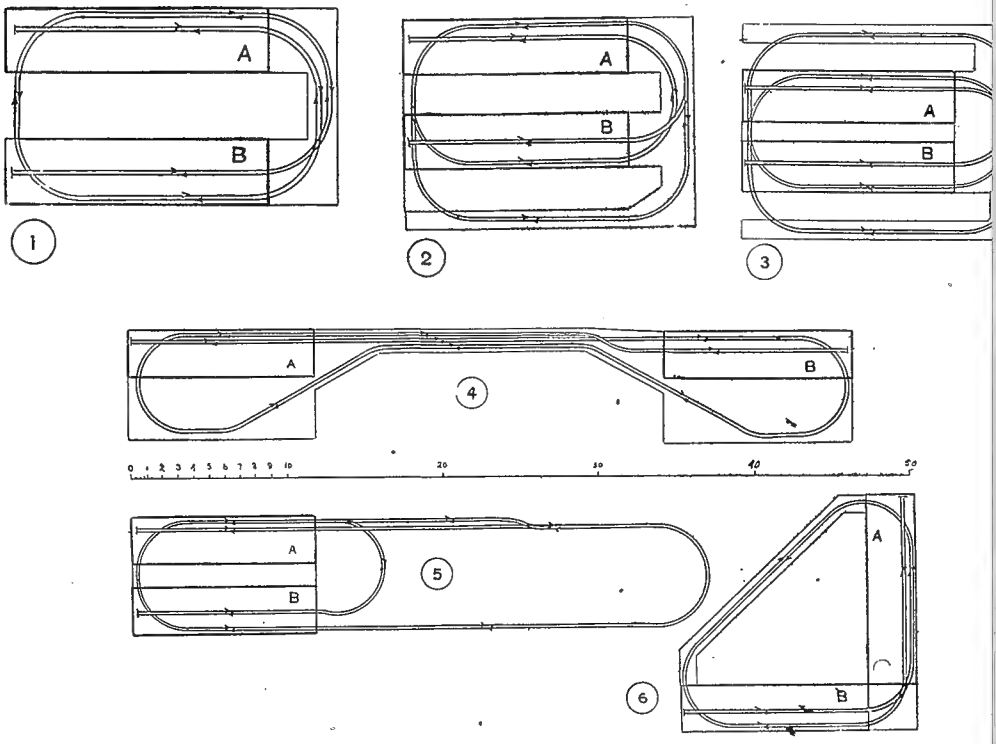



FIG. 38.—Various Possible Arrangements of Fabrication

or other of the termini, little workshop space being required for the task. On completion, the first layout can be stored away and the second undertaken. Even before the main lines are seriously planned or started on, many interesting train movements can be enjoyed. If insulation board is used for the baseboard tops I would recommend that the tracks be laid on the finer of the two surfaces of this material, the whole being painted, with the tracks, dead black on completion, and the paint being then wiped off the rail-top before it dries.

## AN AUTOMATICALLY OPERATING LEVEL CROSSING

The writer has spent much time and thought for some years upon developing a scheme for the automatic operation of a

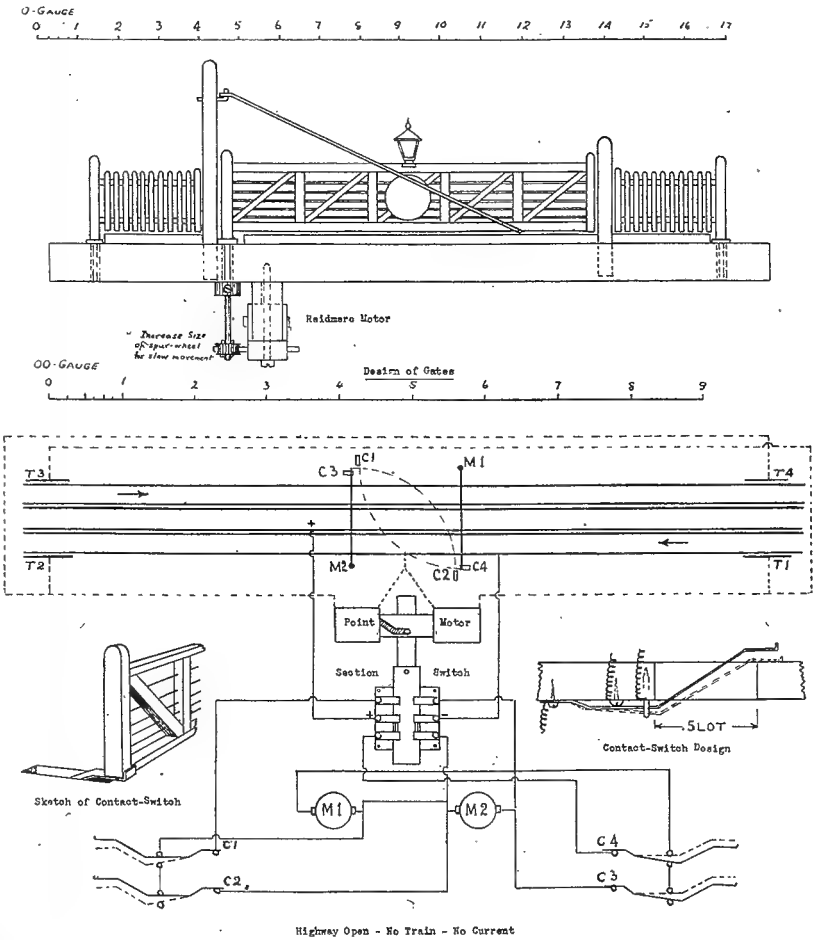



FIG. 39.—An Automatically Operating Level Crossing

common type of level crossing by the approaching and departing trains themselves. The two sets of diagrams offer the considered result. In the first drawing will be found a design for a plain and stout form of crossing gate suitable for O-Gauge or the smaller standards. The remaining diagrams show the various

operating gadgets and the electric circuits and contacts at various stages of the required movements of the gates.

The following apparatus would be required in the scheme presented, two small permanent magnet motors, a solenoid point motor of approved type provided with locking movement and if possible a side-throw, a selector switch of the type already described in these pages, four simple conductor-rail treadles also described, and four simply-made spring contacts for the

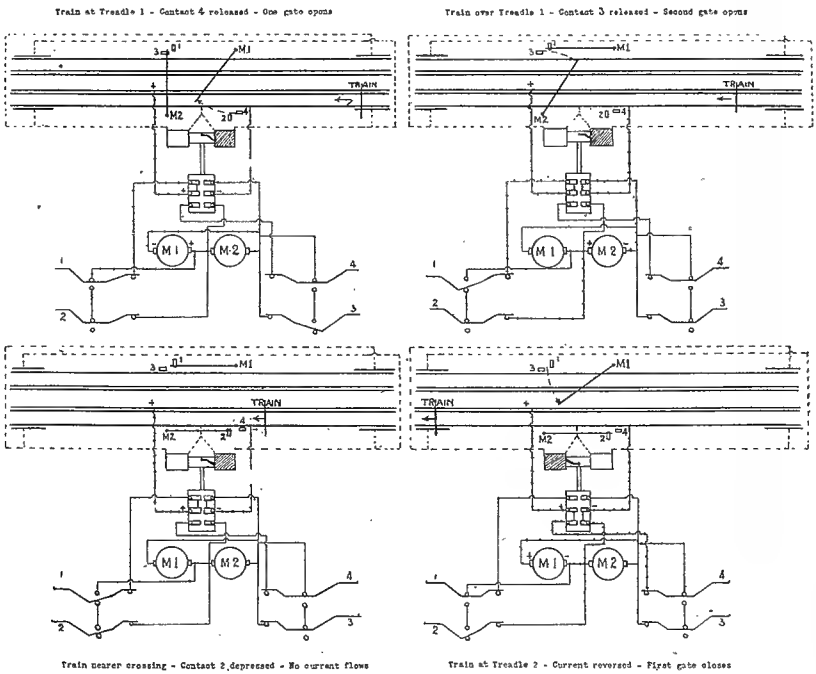
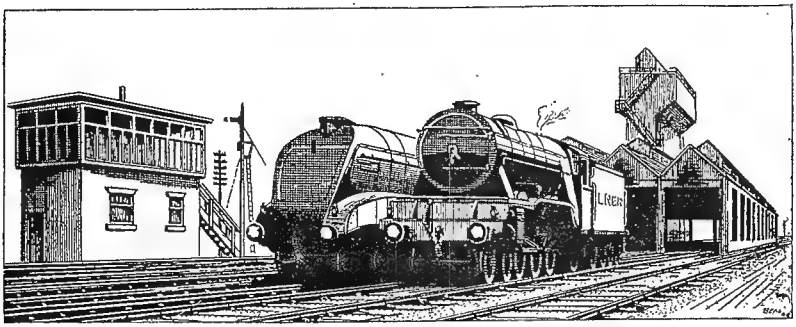

Train at Treadle 1 - Contact 4 released - One gate opens
Train over Treadle 1 - Contact 3 released - Second gate opens
TRAIN
M1
M2
Train nearer crossing - Contact 2 depressed - No current flows
Train at Treadle 2 - Current reversed - First gate closes

FIG. 40.—Current Supply Details for Various Movements

gate posts. The design provided for a Walthers point-motor and selector-switch. The scheme for the contact switch is shown in a small sketch on the right side and the method of arranging the contacts to engage the posts is shown opposite. For the making of the simple apparatus any form of flat metal spring may be used, preferably phosphor bronze or fine watch-spring. The spring, with two screws and a staple, is all that is required, and it operates through a slot in the baseboard just beneath the posts of the gates, in such a position that the base of the post will readily slide on and off the flat end of the spring.

In drawing A (Fig. 39) we have the position of affairs when the highway is open to road traffic as the passed train has left it, with no train now in evidence and no current in circuit anywhere. The dotted lines show the solenoid wires for the point-motor. M1 and M2 are the gate motors. C1, 2, 3 and 4 are contacts; and the motors and the four contacts are also shown in plan. Turning next to (B), we see what happens when an approaching train reaches treadle-1. The solenoid on the right (shaded) is energised at treadle; point motor is pulled over accordingly; positive and negative currents pass to motor-1, which opens the first gate. Meanwhile, while the train runs on before reaching the gates, gate-1 opens, depressing its contact (see C), and motor-2 is thrown into circuit. When gate-2 is opened it depressed contact-2 (see D) and all current is cut out everywhere. The train then passes through the gates, proceeding to treadle-2. On touching this, the point-motor is thrown the other way and the current is reversed; power passes according to the dotted lines and operates motor-1, closing the gate, which (see E) depresses contact-4 and sets motor-2 in action. When both gates are closed to rail traffic the current cuts out. The apparatus is then ready for the next train. On the up-line, of course, the action is precisely the same. The drive between the motors and the gate-posts is worm-gear.

An excellent cheap motor that would admirably suit this purpose, also, is the Trix type, which retails at an incomparably low figure considering its soundness and reliability.



## BUILDING A LOCOMOTIVE ROUNDHOUSE

BEFORE getting on to the construction job, we shall want to know what a roundhouse is, how it is placed, and what are the related yard features. I have tried to indicate matters in the perspective sketch (Fig. 42), as well as in the diagram (Fig..41). Here we have a nine-stall house, complete with power house and store building, and the approximate arrangement of tracks. The turntable shown is of the well type, and is fitted with a scheme which (I think) I have introduced for the first time—that of an overhead current supply to the conductor rail, and a thoroughly happy innovation, in the sense that it works with great success and entirely elimates all past troubles with pivot-brushes, gears fouling pivots and contacts, and bad electrical connections. There are four outside engine stalls, a water tower, signal cabin, men's wash-house, etc. A double main line skirts the depot, and to and from the roundhouse there are incoming and out-going tracks. On the former is situated the ashplant and pits and the coaling stage ; the outgoing track also has the use of a coal chute, and a water standpipe is common to both the tracks. A single siding serves the coal supply to the coaling stage, the stores building and the fuel dump for the power house. A space of 6 feet by 3 feet should serve to accommodate the scheme for OO-Gauge, while an O-Gauge layout would require to devote a site about 10 feet by 5 feet to it. This is not lineally

excessive to the space required for an ordinary rectangular type of shed with its depot.

The fuller plan of the house in Fig. 43 serves to show the construction of the framework of the building. Here there are eleven stalls ; the number doesn't matter in the slightest degree. Fig. 43 will be further elucidated by consulting Fig. 44. Here we see an end section and end elevation. The work would normally begin by the marking out of the turntable site and the

An Aerial View of a Large American Locomotive Depot. The Roundhouse is very Prominent

drawing of the tracks on the baseboard, to be followed by the cutting of slots representing the inspection pits under and between each prospective pair of rails. I suppose most builders would omit the latter ; and in this event, the work can begin with the making of the required number of main cross frames (top of Fig. 44). For seven tracks there should be eight of these ; one more, in any case, than the number of tracks proposed. The frames are built from stripwood ($\frac{1}{4}$-inch for OO-Gauge), and should be built up on an exact drawing made on a sheet of white cardboard. They should be glued with tube-adhesive

and strutted together with the aid of bird-cage wire as shown ; and they must be absolutely alike and absolutely flat, without twists. Ends of wire struts are bent at right angles and forced into holes drilled in the wood. The best method of securing flatness is to hold down the pieces with bent pins until the glue is set, making one frame correctly at one time. Glue in the ends of the wire struts.

Next, draw out on the baseboard the exact mathematical positions that these frames will take ; do this by careful measuring. They are all equally spaced, unless there are to be outside piers (as in perspective sketch Fig. 42) at the outer ends. In this

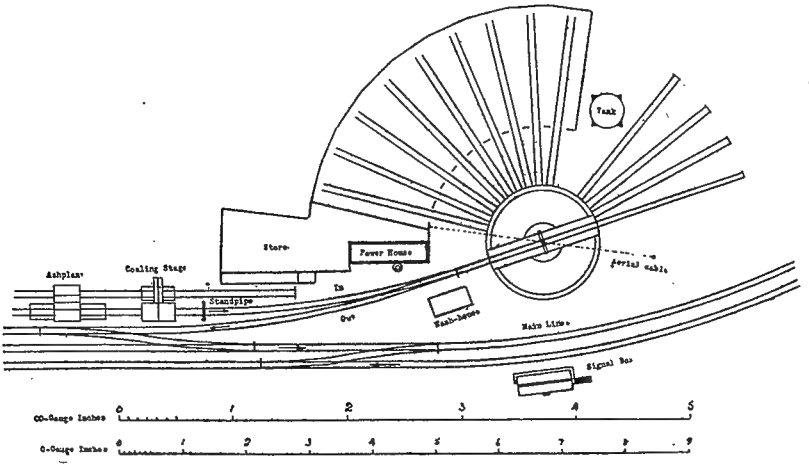



FIG. 41.—Plan of the Proposed Roundhouse and Yard

event you will need the additional space occupied by the piers at these points. But the piers are not essential. It should be borne in mind that the entire building must be detachable from the base, for access to the engines ; and a good way to proceed with the fitting up of the frames would therefore be as follows. Insert into the base of each upright beam of stripwood a headless panel-pin. Drill a suitable hole in the baseboard for each of these pins, exactly at the place where the pins occur. If you think pins in the outer two of the four posts will be enough, well and good. Then, by inserting the post-pins in the holes in the baseboard, you get your permanent positions. It is assumed that you have taken immense care in trammelling out the circuit of the house. Measure always from the centre-point of the turn-table. A strong test of accuracy will be if you find that the

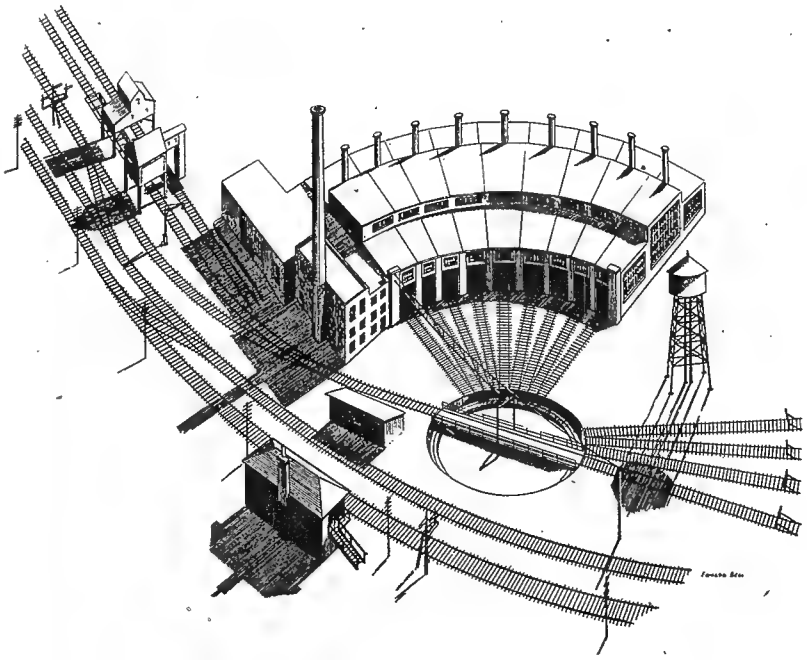


FIG. 42.—Perspective Sketch of Roundhouse and Environs

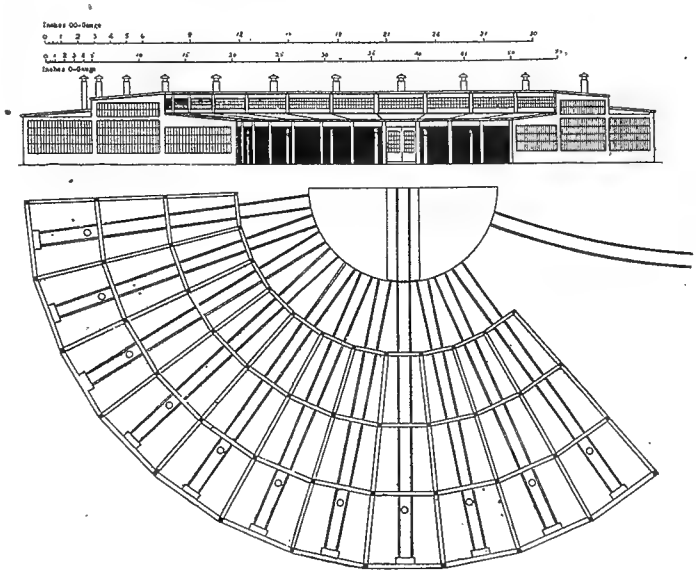


FIG. 43.—Fuller Plan of Roundhouse

cross-beams (four cut for each pair of frames), all cut exactly the same length, fit exactly and do not throw the upright posts out of right-angular relationship to the baseboard. All this must be tested with a set-square. Fit your first pair of frames with their cross-beams, slip elastic rings over the projecting centre posts, first gluing the ends of the beams, true it up, bolstering it in place with weights or cords, and leave it to set hard. Meantime be proceeding with the cutting of remaining cross-beams,

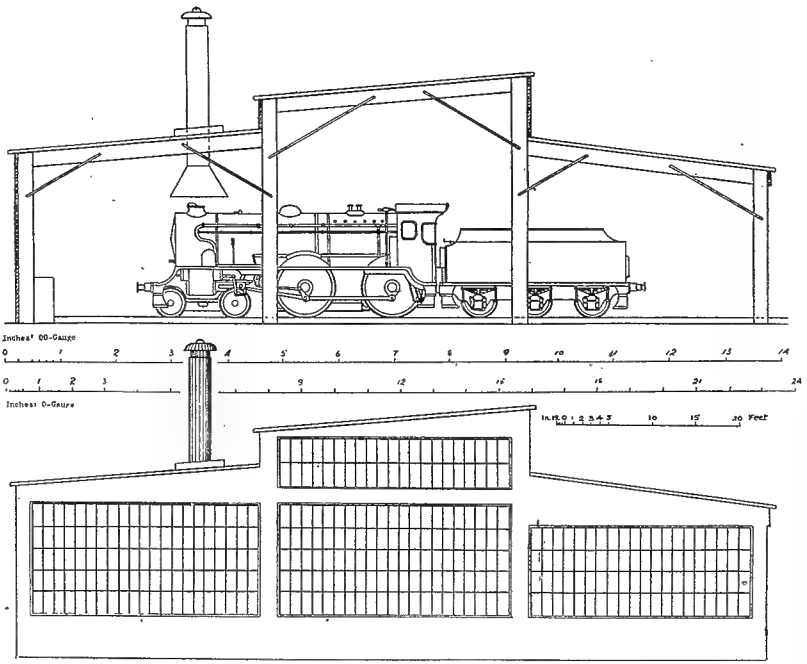



FIG. 44.—End Section and Elevation

or some other job to take your meddlesome mind away from this newly-glued work. An hour later, or day, or a week, as the case may be, you will have the first section duly placed, and fit to be built in line with. But the securing and truing of this first section is the most important task. The remaining ones will almost build themselves, for you have some stability to work in consort with.

The end walls may also now be made. These are shown in Fig. 44. I strongly recommend two thicknesses of cardboard for the ends, with a same-shaped sheet of celluloid glued between with cellulose cement. But before doing this, the windows should

be scribed on the celluloid, painting with red water colour and rubbed off when dry. The inner edges of the window apertures should also first be painted with cement-coloured paint. The question of whether windows will be wanted in each end, or of which of the two ends will require windows, must depend on whether the extension buildings are to be included, and where. The walls at the outer ends of each stall are separate, flat formations, illustrated in Fig. 45, built the same as the end walls. They are simply glued in place. It may be desired to run one of the tracks right through the roundhouse, as is frequently done actually; and in this event doors will be needed in this wall; see also Fig. 45. Additional glazed panels go in the front

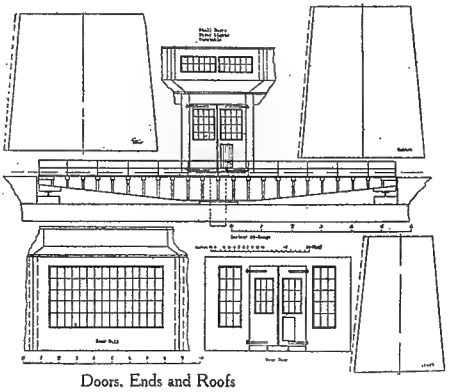



FIG. 45.—Details of Doors and Turntable

of the central raised section of the structure. These, with the designs for the doors of stalls, are shown in the same figure. I have also given here the approximate sizes of the three roof pieces for each ordinary stall. The dotted extensions to these represent the extra lap required for the end stalls—if no front piers are included. If there are piers this dimension will depend on the width of these. The very best way of making the doors is to execute them in thin brass sheeting, with cut apertures for the windows. The firm supplying the brass will do this for you at a reasonable charge. The strap-hinges are of tinplate strip (L.M.C.) soldered on and cleaned off. Hangers are bent pins. The windows would be made to slip into a slotted frame consisting of finest brass angle soldered behind. In soldering, have a dummy window of card to slip in and out. The top of the slotted frame is left clear, there being three sides only.

Fig. 45 also shows details of the turntable, though the form of it does not come within our present subject. Note, however, that for a well-type table, wheels are quite unnecessary; a metal plate may be made to slide over the rail under the ends of the deck, and from this the electrical contact can be taken, two or three rail system. The other connection comes overhead. It consists of a wire taken from a metal post or from the top of the roundhouse wall to a pulley in the centre of an insulated

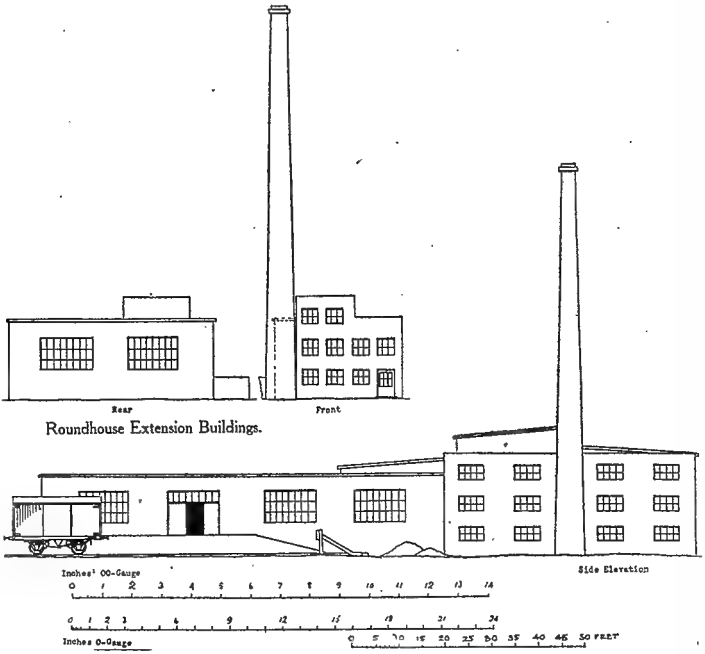



FIG. 46.—Stores and Power House

frame located at the midway point of the deck. For expediting the removal of the deck when required, the wire, soldered to the pulley at one end, has an eye at the other, which engages a hook on the post. The eye also forms part of a light spiral spring, which permits a little variation in the mathematical centre of the table as it turns. Current is fed to the metal post, and passes from the pulley to the third-rail or to one rail of the two-rail system, either of which must be insulated from the deck.

Assuming that the roundhouse is completed, painted concrete colour with a cement-coloured or black roof, it will now be found that it is attached to the baseboard at every post where

a panel pin has been used. The task is now to raise the whole structure from the baseboard, reverse it and extract all the pins with the exception of those, say, on the extreme end posts. These will permanently serve to retain the house in place while not involving much trouble in locating when the building is moved and re-set. Smoke jacks must not be forgotten ; they may take numerous forms, one of which is shown. Dowelling, with a curtain pulley and a screw, is involved in the structure of each jack. In Fig. 46 we have a feasible design for the stores and power house. A plain modern style has been preserved throughout.

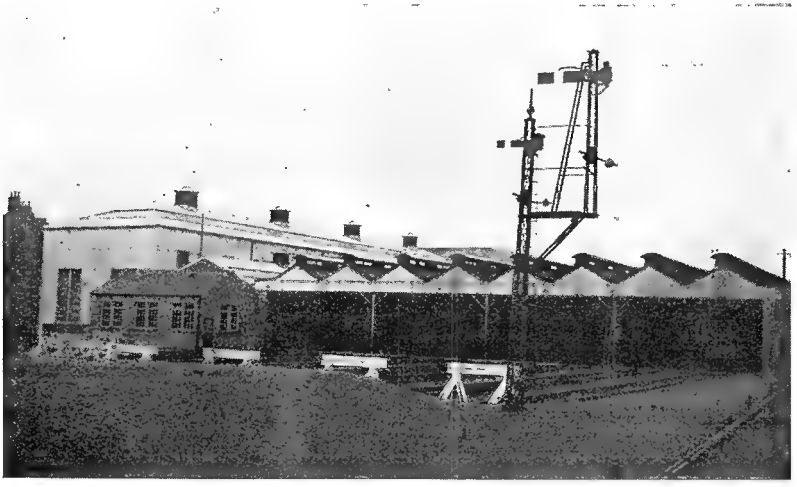
## A RECTANGULAR LOCOMOTIVE RUNNING SHED

The common type of building in which locomotives are housed and undergo light repairs on our British railways takes a rectangular form, though there are numerous exceptions where the roundhouse shed is adopted. A typical modern running shed of the normal order is shown in the photograph on page 64. Modern tendencies are marked in their departure from certain established precedents in shed design ; for example, in the more usual total absence of doors of any kind for the building, in the greater austerity and simplicity in outside structure, and the lightness of the fireproof material very often employed in forming the walls and roof. The fine building shown, which was photographed in the presence of the writer, represents a shed of medium size with a shops-buildings adjoining. In the drawings for a model of this erection, the roads have been reduced to six in number, and the adjoining locomotive shop can be most acceptably used, if provided with a lifting roof, as a storage space for tools, and a receptacle for trays containing parts of engines under repair. On the majority of layouts this is exactly what is required in order to avoid the untidiness resultant upon the leaving about of parts and appliances on the layout baseboard.

A perspective sketch gives the general layout of the depot where the shed would be located. The yard tracks deploy from a double main line, let us say, on the right-hand side. The two tracks parallel to these mains serve the turnout to the shed, and also the servicing tracks, one of which is used for loaded coal wagons passing to the hoist. The cinder pits are beyond the hoist itself, and are served by an overhead light gantry crane.

A stores building, a water tank and a standpipe at the far end of the shed complete the equipment.

Diagrams for the shed itself are given in Figs. 48 and 49. The first item in the work would be the formation of the section of baseboard to represent inspection pits. These are formed simply by cutting the rectangular section of the baseboard into strips to fit the six-foot between each set of rails, an aperture being left between the rails themselves. This would be ½ inch in depth, using ½-inch boarding, and a good scheme for forming the tracks is shown in Fig. 49. For this purpose, angle-strip in



The Typical Prototype of the Rectangular Running Shed here described (Perth L.M.S.)

brass is used, the six-foot ways being provided with fillets of cardboard or thin fretwood, two in number, one of which fits down flat on the baseboard, the other going above it and being slightly wider, to reach to the outer edge of the running rails. One advantage of this metal track is that it can be used for electric power, and it is completely insulated for Two-Rail control.

Wall construction makes no unusual demands, but the roof of the building can be executed in a most simple and effective manner as shown. The roof is formed in one integral piece with the walls and ends, but rests upon a series of columns, soldered up from metal cage-wire, forced into the baseboard, and provided with a stripwood runner along the tops of the columns. On these

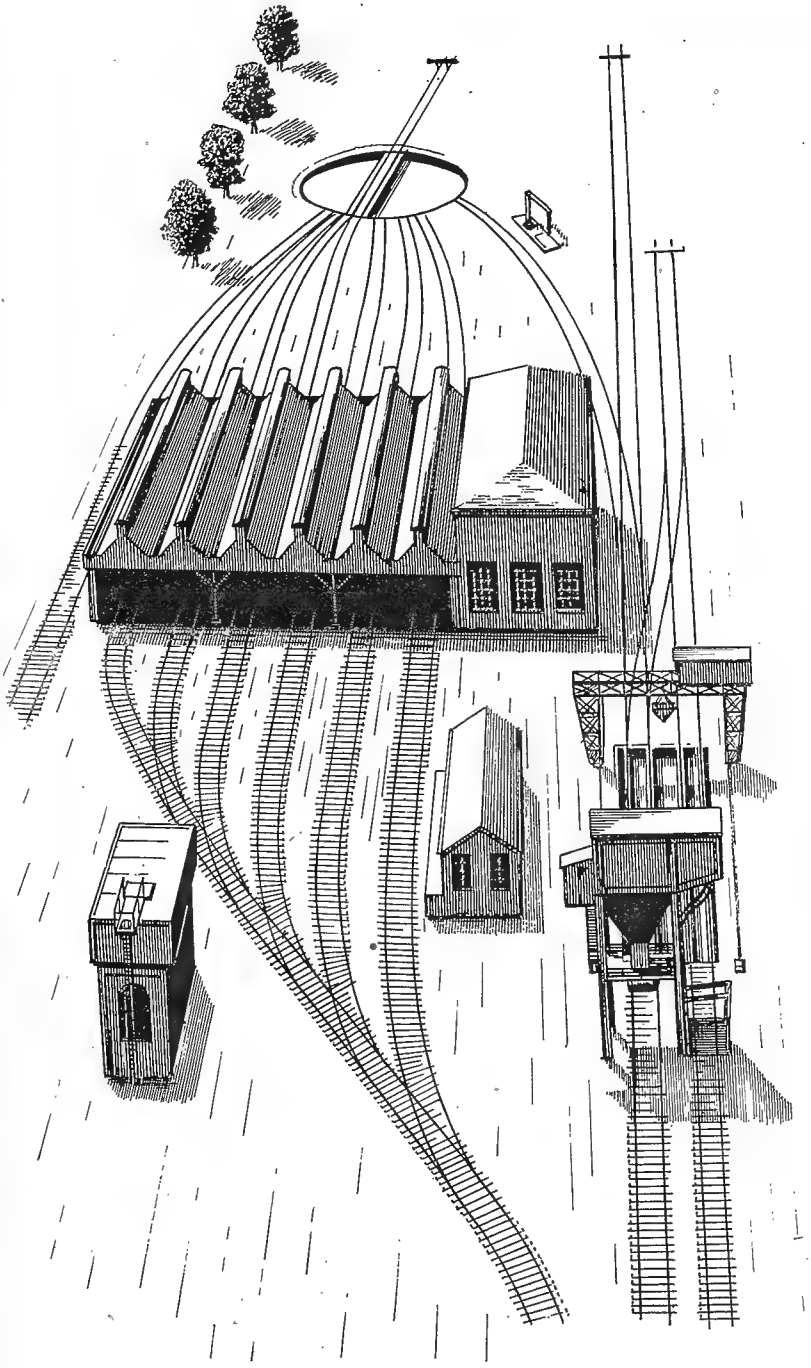


FIG. 47.—Perspective View of Proposed Shed and Depot

runners the shed roof rests when in position. The roof is built up from angular stripwood, with solid rectangular section stripwood for the dummy louvred smoke-vents, these being capped with commercial half-round strip. The surfaces of the wood are then covered with either cardboard scribed for tiles, or with roof paper of an approved kind. The gutter ends at the valleys are provided by the end-masks of cardboard. There is a perspec-

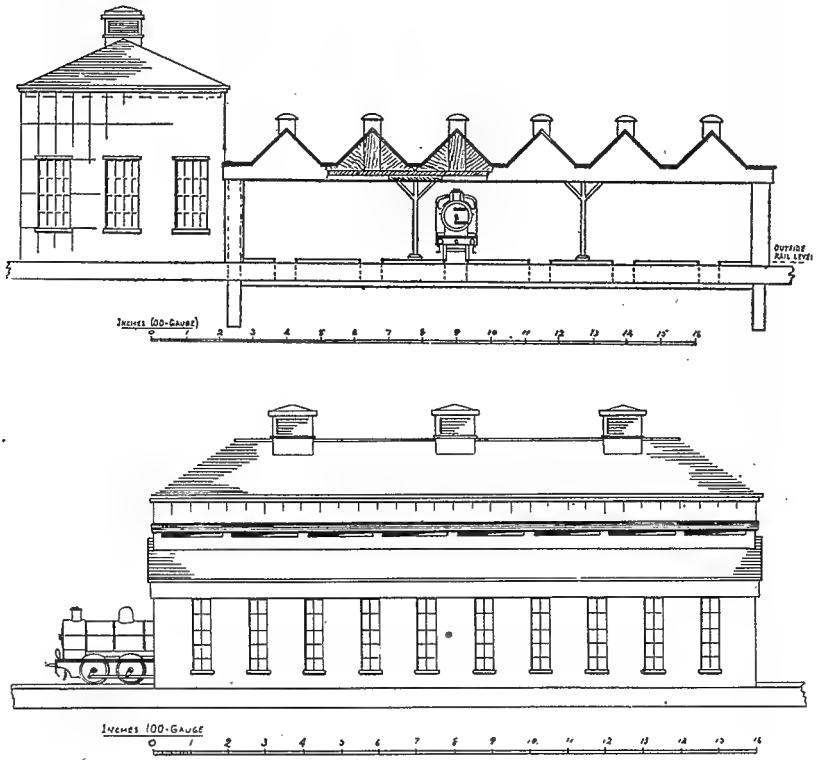
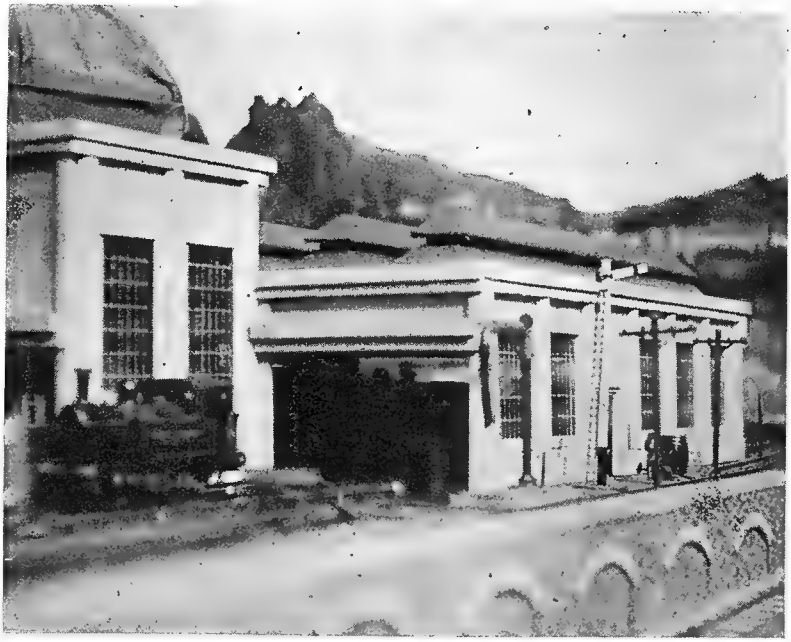
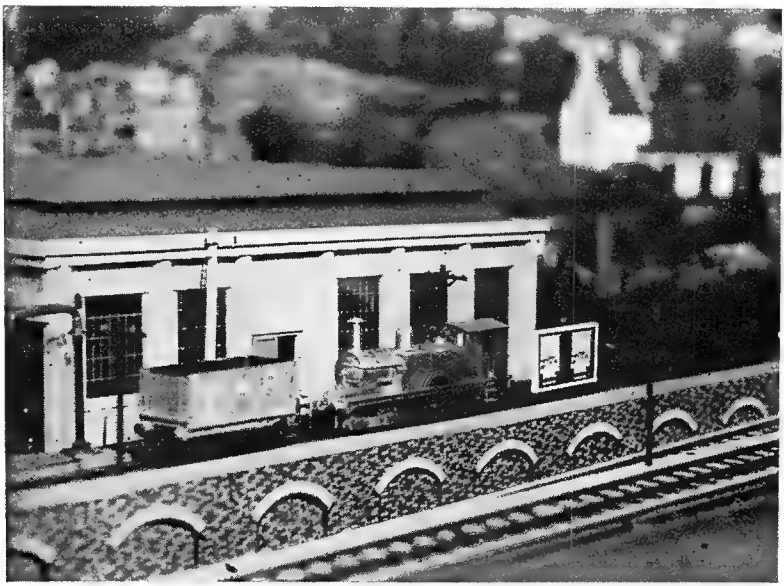



FIG. 48.—Front and Side Elevations of Shed

tive sketch giving a clearer notion of the roof formation in Fig. 49, with a more detailed drawing of one of the columns, eight of which should be plenty for the entire building.

The walls should be finished to represent concrete or asbestos sheeting, iron-work being red or grey. Proper apertures should be arranged along the tops of the smoke-vents by placing cross-pieces of stripwood as indicated in the sketch. Paint the floor of the building black, and see that the tops of the running rails





Two Views of the Latest Engine Shed on the Author's West Midland Lines. N.L.R. Locomotive in Lower Photo

are clear of the floor surface, so that engine wheels will always be in electrical contact with the rails.

A useful fitment is also shown in Fig. 49. The idea is to provide a pair of retainers for holding the mechanism of a locomotive while under testing. This is secured by cutting a slot and an inlet into the baseboard, as shown, over which a pair of simple Hobbies' clamps are fixed and adjusted as required. They should be screwed tightly, allowing just about a sixteenth-of-an-inch of play, so that the mechanism, standing on the rails, can find freedom of wheel movement. This appliance will leave the operator's two hands free for his work on the motor. The

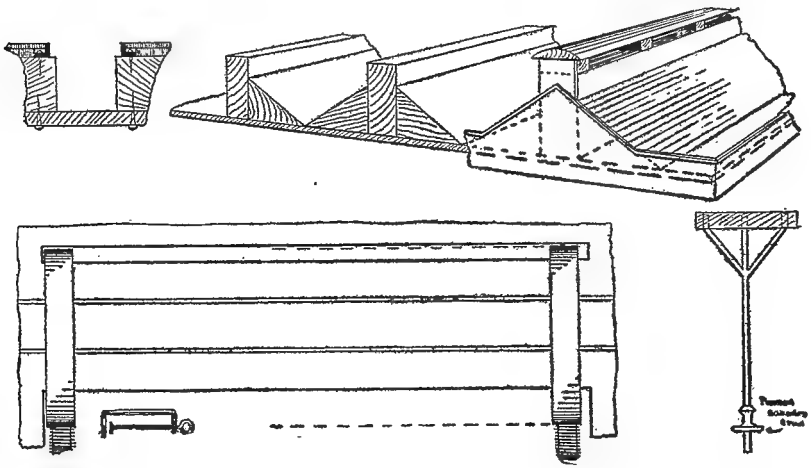


FIG. 49.—Inspection Pits, Roof Work, Columns, etc., for Rectangular Locomotive Shed

tops of the clamps should come at about buffer-level. This contrivance may well form part of the equipment of a locomotive siding at a depot on a model layout.

## ENERGISING AND OPERATING TURNTABLES

Time and experience continually bring out new discoveries in every branch of railway modelling, and this subject is one upon which there was and still is, always scope for advancement. There are a few things worth saying concerning design, construction, controlling, placing and supplying locomotive power to turntable models.

It is commonly known that there are two main types—the flat disc and the well. These are illustrated in Fig. 50 at (A). The well type requires a circular aperture in the baseboard, which is best made by forming it in a square section of wood which later fits into a square hole cut in the permanent boards. The well need not be very deep, but it requires to have a circular raised runway within its circumference on which a single rail is laid. This may be an actual rail, laid in chairs, or merely a piece of square section wire soldered to pins at regular intervals. A good scheme is shown in (E), where a number of card or wood circles are imposed on one another. A correctly formed girder structure should be arranged beneath the deck, which has hand-rails along the full length, one each side. To be accurate, of course, there should be four flanged wheels running along the rail, but the majority of workers will find this type of structure almost impossible to construct with accuracy. The faintest hair's-breadth of variation will lead to endless trouble, and to eliminate such variation is a task for experts. It will therefore be comforting to know that wheels may be entirely avoided, provided that the joint of the rail is made with solder and without a break. The scheme then is to attach a block of wood at each end of the deck, within the girders, the wood blocks being faced with smooth metal to slide along the rail top. In order to ensure that both ends are always in contact with the rail (through which the current has to pass to the running rails) it is best to dispense with any form of "hold down" pivot at the centre, and to substitute a pivot of hard dowelling of quite large diameter—about $\frac{1}{2}$ inch—which simply slips into a hole in the deck, the latter being of metal. It will be found that such a pivot will never tend to tip the deck when it revolves, as any other pivot will if it is not perfectly perpendicular.

The flat disc type is simpler to construct, and is best made from a circular tinplate sheet, accurately cut to diameter and having a hole for the dowelling precisely in the centre. The deck is of similar material—a stout tinplate being essential—and has a similar hole. The deck should be the same length as the disc diameter and should have curved ends. In Fig. 50 at (H) and (I), will be found elevations of each type of contrivance. Here, the disc type has upper girder sides, though these are not necessary. In arranging the rail on the disc type the smallest possible size of square wire should be used that will guarantee an electrical break between the disc and the deck. This is

advised in order to keep down the deck rail-level so low as to avoid undue packing of the approach tracks. On the table you will have disc thickness, plus rail height, plus deck thickness, plus running rail height ; on the approach tracks you will have sleepers and running rail only, and the one should equal the other as nearly as possible. It is, therefore, also advisable to use busbar for the running rails on the deck of the table—a procedure which can be made quite correct in appearance if the rails are made to represent examples set within a crowned (or built-up) surface. This is done by gluing wood or card strip inside and outside the tracks, level with the rail-tops. In the disc type of table, the deck sits flat upon the circular rail, and, of course, the disc itself is painted or finished to represent concrete.

Lingering over Fig. 50 awhile, there is an interesting scheme shown in (K) and (L) whereby, as in certain existing instances, notably on the Southern Railway, a series of outriggers are arranged to bear a system of revolving handrails which fence the well for safety. In (K), the plan, it will be seen that metal rods pass under the deck, through notches in the girders, and project to the very edge of the well. In a model, the ends of these rods—cage wire—are bent up at a right angle and serve as handrail stanchions. On each side of the deck, therefore, we have as it were, a half-moon arrangement of handrails, including those of the deck itself, see (L). When the deck revolves, the handrails turn with it. I have seen several models of this order and they look extremely well.

Some other useful hints may be found in Fig. 50 (B, C, D). In (B), we have a common method, which is sometimes used in America on real railways, of extending the lateral capacity of a table without reconstructing it. This was formerly found most useful on the West Midland, when large Pacifics became the order of the day. In a word, a short length of track is added to each end of the running tracks by means of fishplates and solder. It may, if so desired, be found wise to attach a sleeper to each extension to preserve alignment. This added inch or so of length will make all the difference between a table that will not take a Pacific and one that will.

A sound and simple locking scheme for a manually operated plant is shown at (C). This consists of a scale lever from a lever-frame, which is ready bored for a pivot at one end and has a shaped handle at the other. The lever is bent to shape and soldered to a piece of flat brass to form a cam, which slips

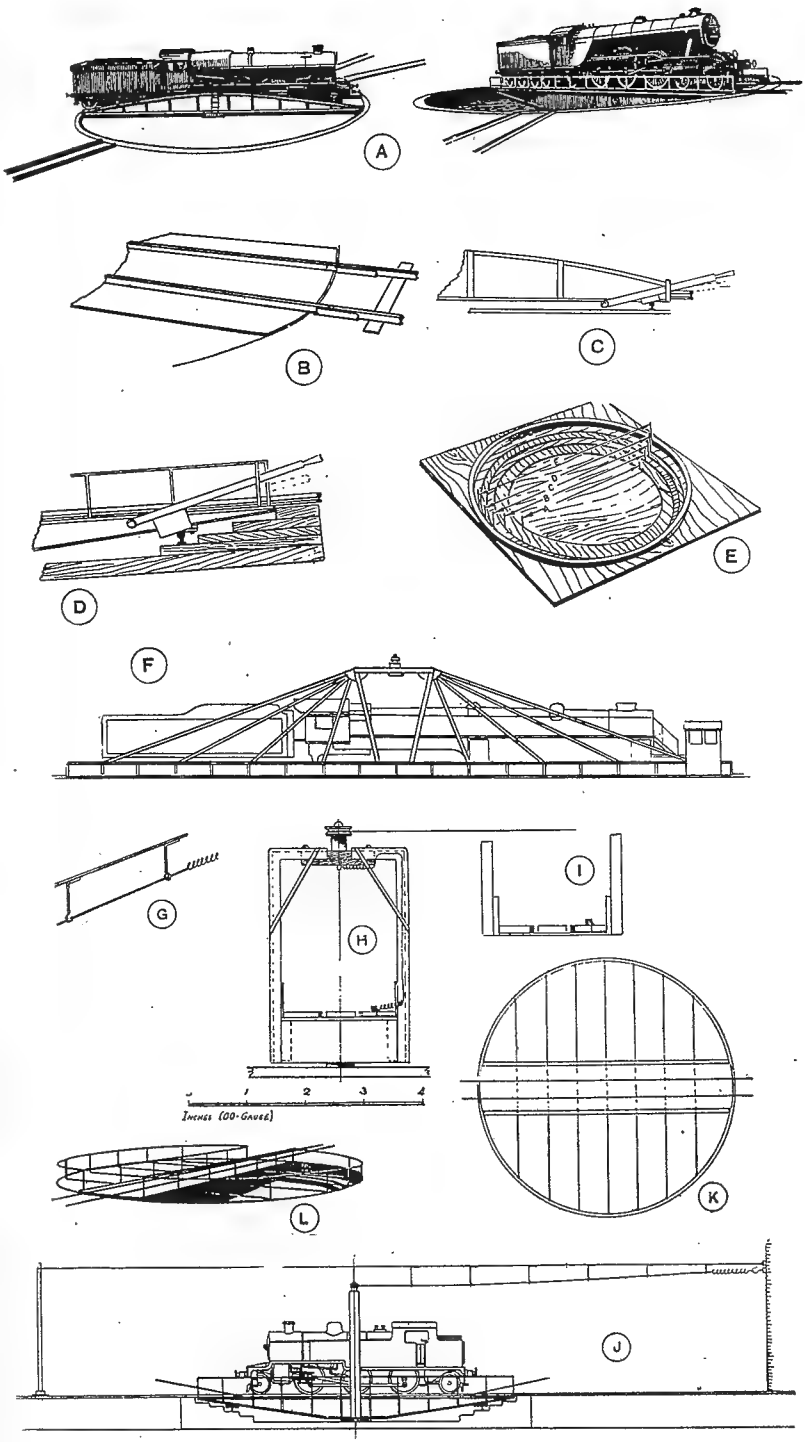



FIG. 50.—Locomotive Turntable Details

into a notch filed in the rail at the exact point where the deck should stop its movement. A yoke of metal strip or wire is attached to the girder, or is formed like a staple, and serves to

A Water Tank of the American Type modelled by the Writer on the Trestle Principle

hold the lever rigid. The same lever can thus be used for revolving the deck. In (D) we have the identical idea applied to a well turntable, the cam being of whatever size is suitable. In (D) its length is considerable.

We have dwelt briefly upon the supply of one element of the

locomotive current through the deck of the running rails. It is the second element that is always the trial of ingenuity. Most troublesome it is, if not entirely impossible, in the smallest standards, to arrange for the insulated pivot, the collecting-brush and the lead to the conductor-rail within the straitened limits between the rails. A consultation of the sketch (Fig. 50) will reveal what is almost the prevailing method at all large American depots of providing the electric power of manipulating a turntable. This is accomplished by means of a lead taken from a post or a wall and carried beneath a messenger wire. The latter passes right across the turntable, but the lead itself only reaches an insulator over the centre of the deck. It has occurred to me that this would prove a most acceptable method of conducting current to the outer conductor-rail on a model. In Fig. 50 at (G, H and I) are given details. The messenger wire is a fixture and has the looped drop-hangers for the live lead. This live lead is attached at one end (by solder) to a pulley wheel which provides the swivelling movement for the rotation of the deck, and at the other end to a light coil spring (which helps to convey the current) permitting any slight stretching of the wire that is demanded by irregularities in the structure. The construction of the overhead gantry is shown. In (H) we have complete details of the insulation of the pulley, the gantry being of channel metal and soldered to the deck at the base. The pulley pivot passes through a wood block, which is bolted to the metal. The pulley must be loose in its pivot, and a fine wire may pass down the inside of the gantry to the outer conductor-rail, which must be insulated as usual from the metal deck.

In diagram (Fig. 50 (F)) will also be seen one of the newest styles in American turntables where these are required to be of extraordinary length for Mallets and similar lengthy engines. A truss girder scheme is here adopted, with, it will be noted, the same method of current supply, the deck itself being also spanned by a pair of plate girders.

A few words now on the placing of turntables. I have collated in Fig. 51 a group of adapted or slightly modified schemes from existing layouts at Camden, King's Cross, Temple Meads (Bristol) (G.W.R.) and Bognor Regis. In (A) we have an arrangement most compact, whereby the turntable is practically independent of the shed approach tracks, and yet very readily serves them. In (B) we have a service and turning depot only, with the incline type of coaling stage. Temple Meads (C) has the same type

of stage, an entirely independent table very conveniently arranged for a model. Bognor Regis is located for great convenience of access from goods and passenger depots, the table being apparently

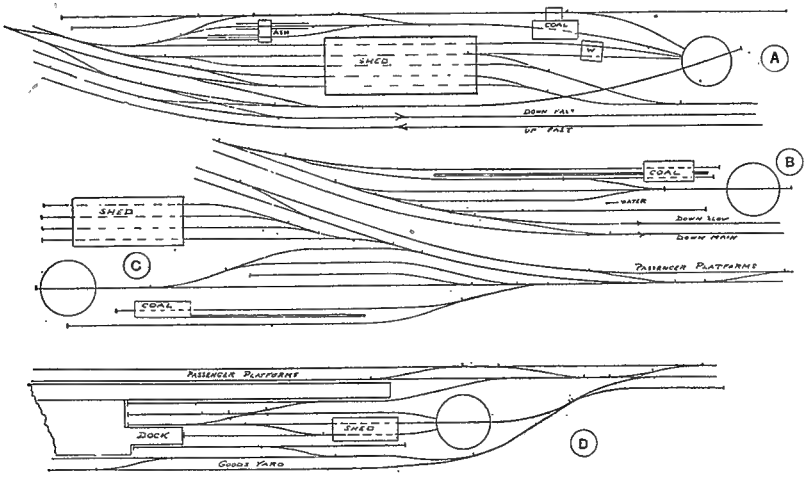



FIG. 51.—Turntable Locations suggested by Actual Railway Instances

used as an exit to the roads. In each of these designs the aim has been to furnish modellers with good schemes for the placing of engine turning appliances as handily as possible for traffic

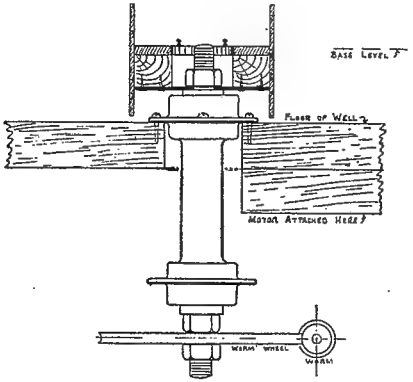



FIG. 52.—The Use of a Cycle Hub as a Turntable Pivot

purposes, which is the most important factor to bear in mind in all such planning.

The passing of time brings forth many new ideas regarding the mechanical operation of turntable models. Some of these,

though excellent, are somewhat involved from a mechanical standpoint and demand a measure of skill not possessed by every worker. I have recently carried out some experiments with a common push-cycle hub with great success. For the purpose I bought a new hub at a trifling price and found that it lent itself admirably to the occasion ; the gearing only required to be added, and the common Meccano worm drive will be found entirely satisfactory when once it can again be obtained. The actual movement of the ball-bearing adjustment, once it

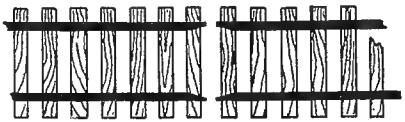
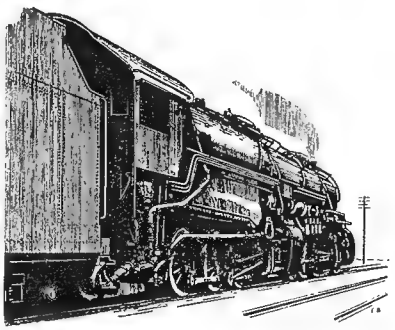
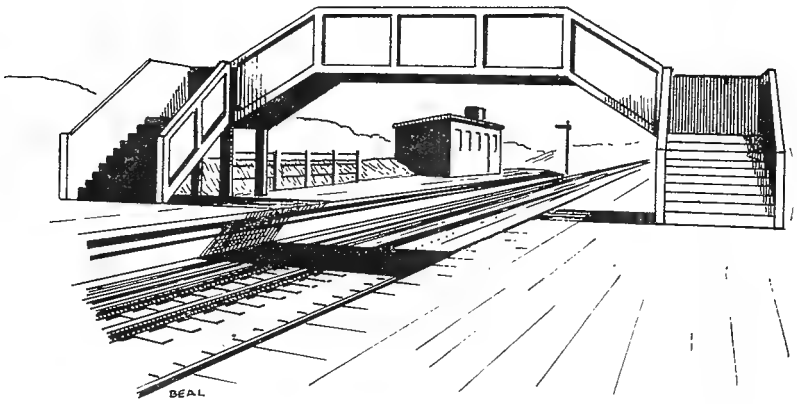


FIG. 53.—Device of Filing Rail Ends to avoid Turntable Derailments

is adjusted, is perfect for the task. The spoke-holes offer exactly what is wanted for the attaching screws, as will be seen by consulting Fig. 52. The floor of the deck of the table, which should be of metal or stout tinplate, is screwed up through a suitable hole by means of the upper adjusting nut. An additional nut at the base secures the worm wheel. This method is adaptable only to the well-type of turntable, but for that purpose is ideal. A second-hand hub will serve the turn so long as it is not worn about the bearings.

The author has recently tested an ingenious turntable mechanism designed by Modelcraft Ltd., in which electrical current is used, but the expensive electric motor and reduction gear is eliminated. The mechanism is extremely easy to construct and is about as foolproof as possible. Plans for making it are included in the Modelcraft series of " Lineside Plans."






## COACH STORAGE TRACKS AND SHEDS

IF it is imperative on an actual railway system to provide ample storage accommodation for empty passenger coaches, it is perhaps doubly so on a model layout, where trackage in general is necessarily much more scarce, where there is usually only one operator to manipulate the movements of trains, and where trains are arriving in close succession at a station and requiring an open destination. There is, furthermore, a definite need, for the same reasons, to provide for the shunting of empty trains in and out of the platform tracks without occupying the main lines of the railway. Of the various schemes for arranging the tracks for storing coaches, three very practicable ones are shown in Fig. 54. In (A) we have a five-track coach shed located at a terminus station, approached from a headshunt track—a track specially provided for the reception of trains from the platform tracks and their reversal into the shed tracks. In (B) the shed and its tracks are totally dispensed with, the station being a passing one, but the headshunt track is provided on to which a temporarily redundant train can be withdrawn in readiness to be run again into the platform tracks when required, meanwhile leaving the main line tracks clear. In (C) we have a different scheme entirely, whereby a run-around is provided

for the engines of arriving trains, so that they can pass to the outer end of the coaches, push them into the sidings provided,

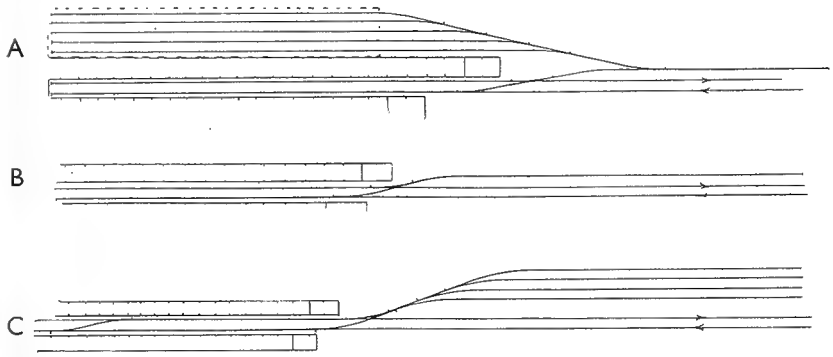



FIG. 54.—Coach Storage Sidings

and then withdraw again to the main line. These arrangements are shown as entirely distinct from all other traffic provision at the respective stations ; it is possible, for instance, that the

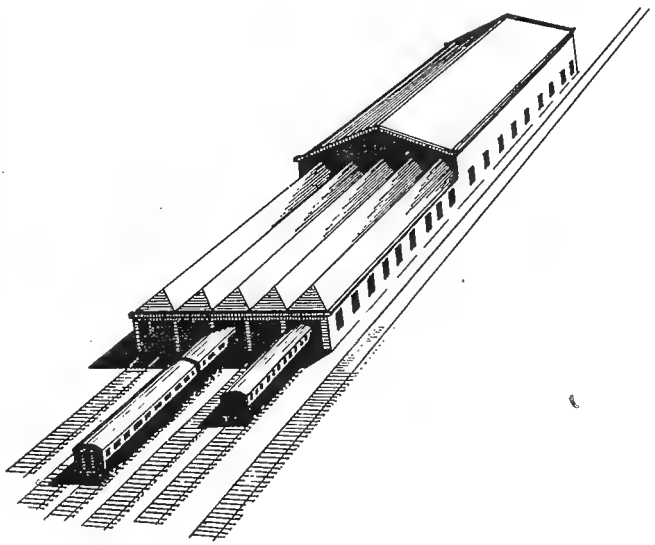


FIG. 55.—Five-Track Coach Shed

single-slips would require to be double ones when the full demands of the local traffic were catered for.

If the designer of a layout will provide any of these facilities, he will cease to be troubled by the sudden overcrowding of his

stations and the temporary panic, with its hold-up of traffic, that ensues. The only other scheme known to the writer apart from these three is that of furnishing accommodation after the manner of (C), but with the provision also of a ladder at the outer end of the storage tracks, for the liberation of engines after they have drawn in their trains. This method, however, involves that one of the storage tracks shall be used as a return track for the locomotives, and it is therefore considered wasteful of track.

On the average layout, something more than the mere accommodation of empty coaches will be required—provision

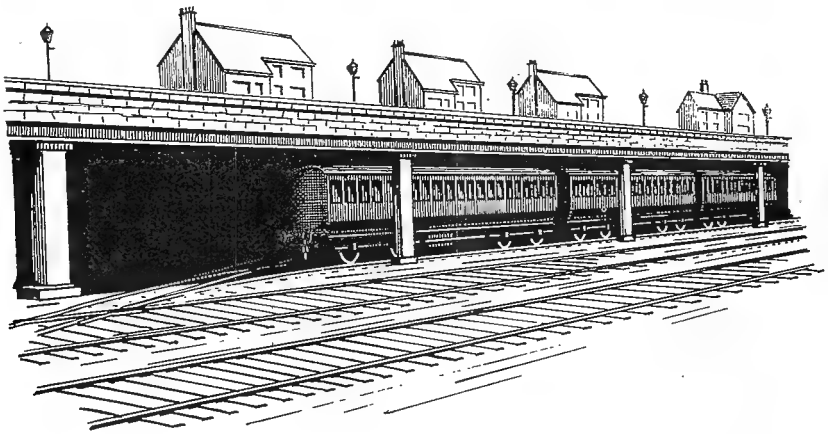
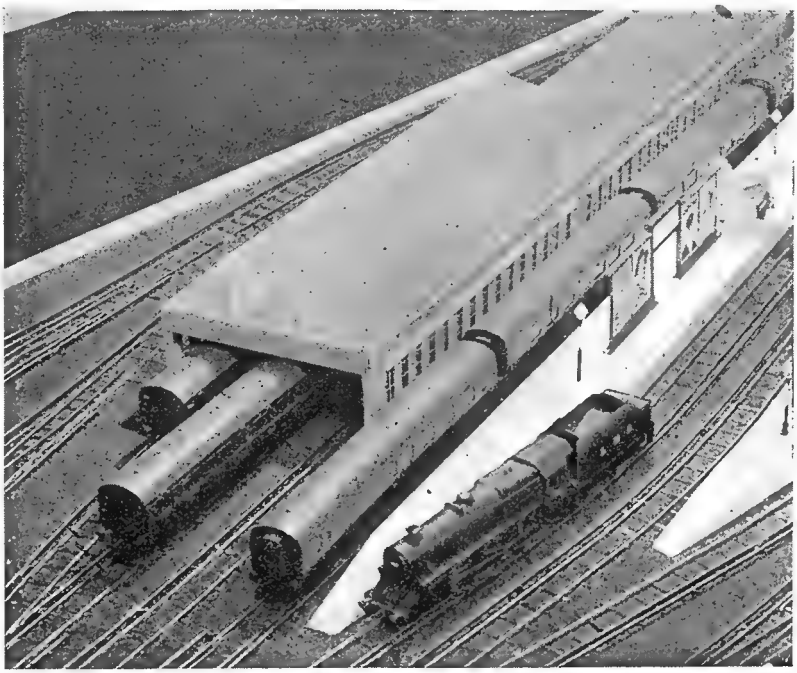


FIG. 56.—Coach Storage Accommodation under High Level Street

must be made on some locations against the rays of the sun, dust and so forth. A coach shed is indicated ; and although this is usually a somewhat cumbersome building both to make and to locate, it is worth while to instal one under such circumstances. The sketch offers a suggestion for a five-track shed, the building being provided with a two-storey half-section, the upper floor of which can be used for tools and parts. There is also a photograph of a similar shed, minus the toolbox, taken on the old West Midland Lines. The shed is not difficult to construct, though it should if possible be made in two halves to facilitate packing on removal, for it will be fully 4 feet 6 inches in length. The front entrance facade, with the four square columns of stripwood, should be built up as one piece in order to get the columns securely glued and pinned in place.

It is not invariably necessary to erect a shed for the purpose of covering empties. The layout may itself be such as to provide shelter under roads or high-level floors for this purpose. The sketch (Fig. 55) suggests how a couple of storage tracks might well be arranged beneath a highway on an upper level, such as actually did exist—though not thus utilised—on the former W.M.R. The scheme is acceptable in that it is capable of putting the same space, on a restricted layout, to a double use ; but



Coach Storage Shed on the former West Midland Lines

it is a wise plan to make the upper level detachable for access, if necessary, to the coach tracks below.

As for the number of coach-sidings required on any given layout, it would be a good rule to proceed upon if accommodation were provided at the largest depot for as many trains as are eventually likely to be engaged in service. It has always been the writer's own custom to run all passenger trains as block units, without any intermediate coupler control ; and this scheme, while also having many other advantages, reduces all confusion in the handling of empties at storage yards.

## PASSENGER STATION BUILDINGS

The modernistic design of passenger stations has one great advantage for the modeller—it is simple in its constructional demands. The scheme here given in the sketches and elevation drawings (Figs. 57 and 58) should meet the various requirements and present few obstacles for the fresh starter. Anything especially ornate in its proportions is really not required for

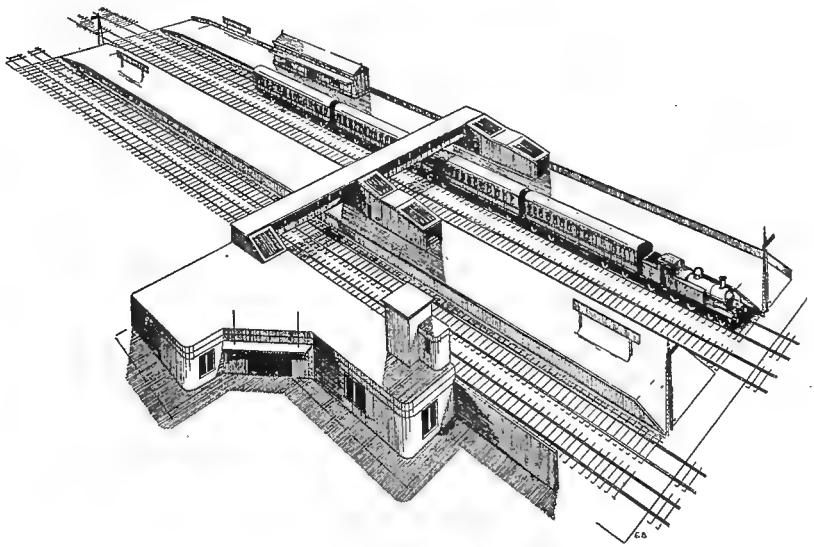


FIG. 57.—Modern Style of Open Station

the average layout, and the scheme here given embraces a simple one-story building of a style which would suit almost any location, and particularly a corner site. There is the main building and a covered footbridge, which might take either two or three stairways, together with a tower that might comprise a signal cabin for the entire station, and a dummy water cupola. In Fig. 57 the track layout includes three through roads and a coach siding, the latter laying next to the station concourse. But the arrangement and the purposes of the tracks might be varied according to desire, suitable platforms being arranged. If the track adjoining the concourse is to be used for train service, a platform would require to be laid adjoining the building, but this would need no stairway to the overbridge ;

the passenger exit or entrance would be on the same floor as the concourse. It will be obvious that the style can be adapted to any kind of platform scheme and to any number of platforms. Freight facilities can be arranged at the rear of the far platform.

The main building would be best built around a wooden

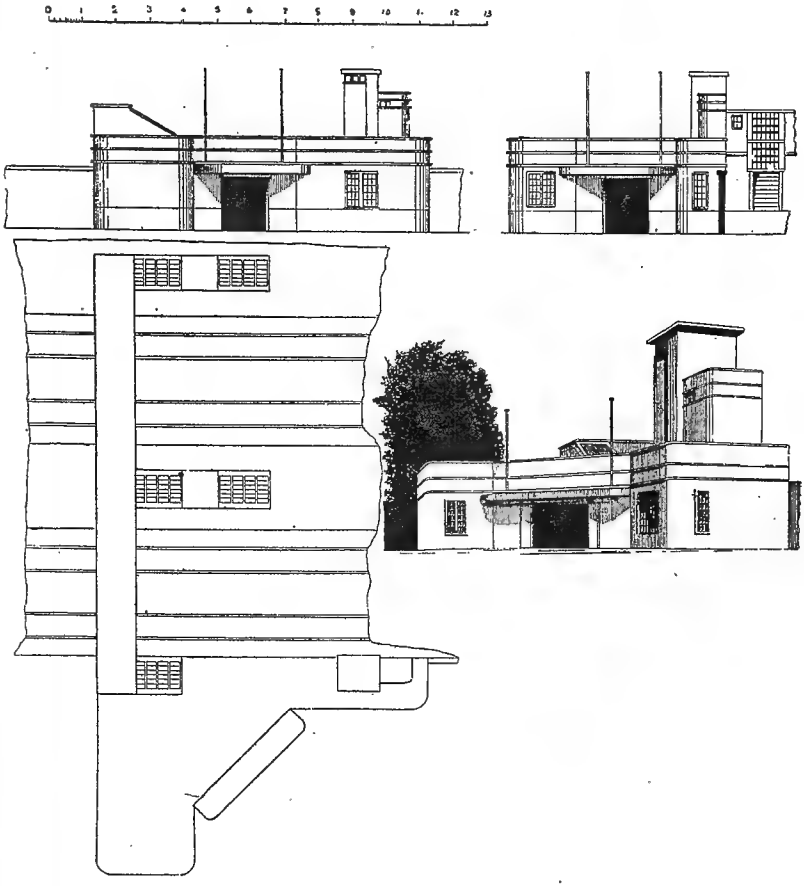


FIG. 58.—Further Data for a Modernistic Concrete Station

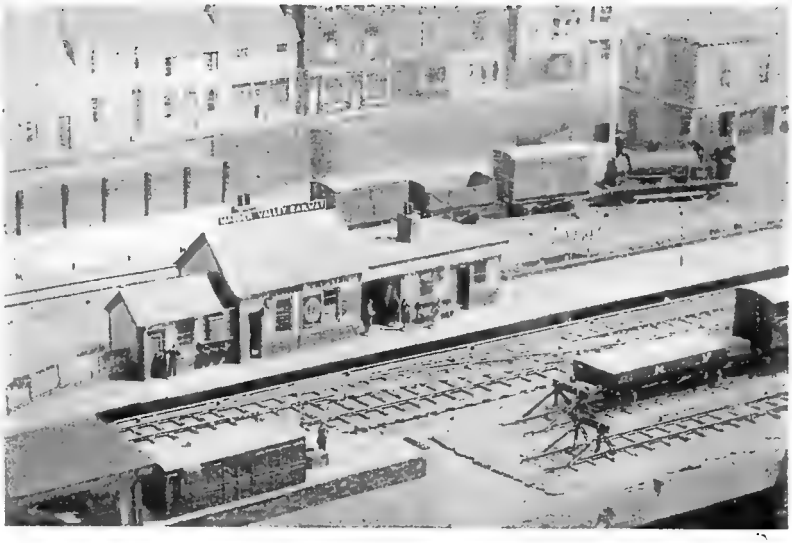
roof-piece, the rounded corners of which had been correctly shaped. The actual dimensions decided upon are not important; much would depend upon the location and space. A cardboard base of the same size as the roof should also be cut. The outer walls, which come exactly flush with the roof-edge, should be in several pieces, joints occurring at the square corners. The wall materials should not be very thick, but thick enough to

stand up to window construction. The latter are of celluloid, or may be in any other commercial style. They must be strongly affixed to the insides of the walls, and for this purpose I recommend adhesive parcel strip as well as glue, the strip being pressed strongly down by running the fingernail right into the ledges of the celluloid. The perspective sketch in Fig. 58 shows the thin beadings attached to the walls for copings. The towers may either be constructed in the built-up manner or may be worked up from solid blocks of planed wood. In the latter event, any windows would consist of celluloid sheeting, properly scribed for sashes, extended over the whole side of the block where they occur, so as to leave no ridges. The surface of the celluloid is then covered with adhesive tape, excepting for the window apertures previously cut out, being afterwards painted.

The covered bridge is of very simple style, having celluloid windows also. Smoke-screens should be attached underneath the footway over the track-centres. The skylights are of scribed celluloid, which may be attached with adhesive strip, the latter being neatly trimmed off along the outer roof-edges. The stairways are built up from thin fretwood, one length laid above the next, and there need only be enough steps to meet the demands of visible realism near the entries. This wood is also used for the canopy over the front entrance to the concourse. Blanket pins can be made into excellent flagstaffs. The exterior finish of the buildings is concrete; the walls should be given one coating before the windows are fitted, so that the edges of the apertures can be neatly painted. Use a flat-drying soft cement-grey, of which a second coat will give a fine finish. The roof may be either concrete of a slightly darker shade or a dark slate-grey. Concrete, on the whole, is better.

In Fig. 59 we have designs for two types of platform shelter which might go along with the station design, one being suited to an island platform and the other for a walled platform. The upper design would make a very nice wayside country station in itself. The awning strip, complete with guttering, can be had from Kenyon, of Bradford. Both styles might be finished as concrete if required for the station already described; or they might be lined out as shown and painted light buff to represent wood structures. In either event, the side and end screens of the buildings should be finished as woodwork.

I am indebted to my friend Mr. John H. Ahern for some notes on his method of forming valance edging for platform awnings



Two Views of Madderport on the OO-Gauge Layout of Mr John Ahern.
An " old time " small terminus is perfectly represented

which may usefully find a place at this juncture. The method (Fig. 60) is adaptable to all the smaller gauges and has the advantage that two lengths of valance are produced at one operation.

Begin by cutting a strip of cardboard, double the width of the required valance and as long as may be necessary. Rule a pencil line lengthwise down the middle. A leather worker's

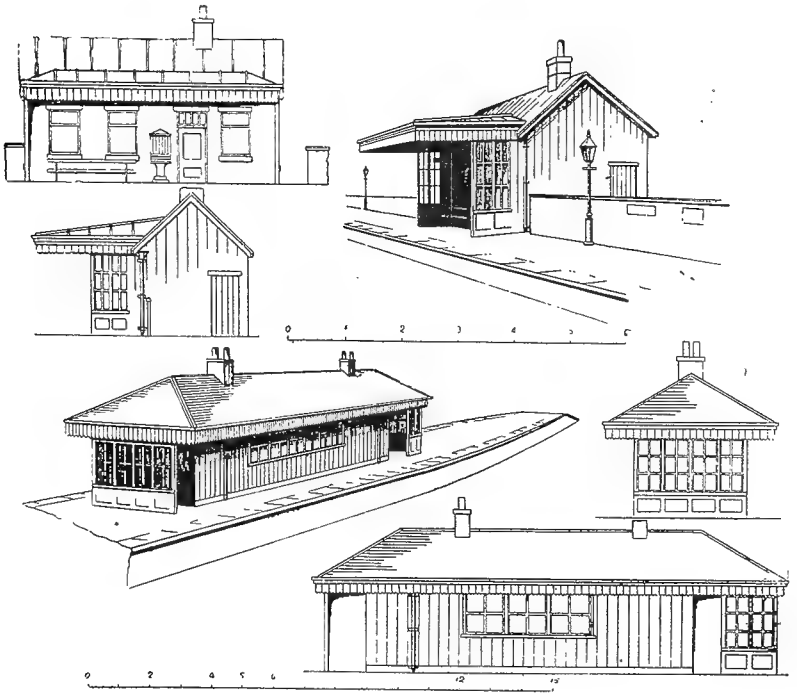


FIG. 59.—Platform Passenger Shelters

or other suitable punch is needed, the exact size not being important so long as the finished article looks right and in proportion. Equally spaced holes are punched exactly on the pencil line, the intervals between them being about equal to their diameter, or a little less. It is important that they should all be located centrally on the line or the result will be rather untidy. The card is divided down the pencil line with a very sharp razor blade, and two most convincing lengths of valance will result.

A further refinement is to make half-cuts through the centre

of each hole as shown in one of the drawings, to represent vertical planking. The card used should be rather thin but of good quality, and the valance should be well hardened with a coat or two of shellac.

It might be useful to include some sketches of the four new stations on the rebuilt West Midland Railway, since all of these follow modernistic practice to a great extent, and certain of the designs are rather well adapted for application to awkward locations such as persist in occurring on miniature layouts. The station at Methven (see Fig. 61) was required to fit into the narrow accommodation remaining along the end of a single

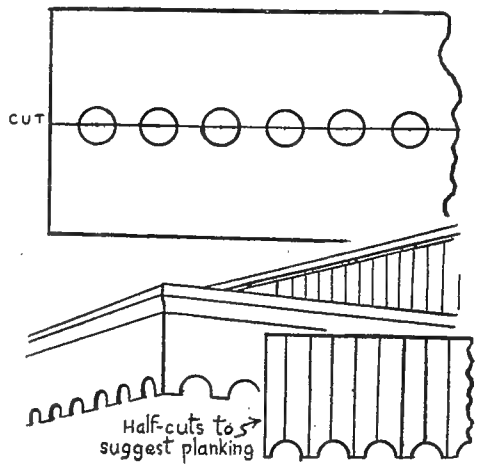



FIG. 60.—Mr Ahern's Scheme for making Valance Edging

wayside platform where there was also no room for a signal box ; the latter was therefore, as is now frequently done, incorporated into the station building itself, forming a continuation of the upper portion of the concourse. The building backs directly on to the rear scenic wall-sheet, which at this point represents a small village green with an approach road. The nearer of the two tracks has no platform, being merely a locomotive loop. In the second sketch, that of Melthorpe, which is a fairly large dockside terminus, the scheme is confined to a somewhat wider island platform, and the roofed portion of the latter involves seven spans after the pattern of the three shown. The width of the island is only 5 inches overall, but it allows ample space. The awning is built integrally and lifts

off in one section. Awning supporting columns are soldered up from cage-wire and have laundry studs for bases. The Colstead station is of an entirely different type; it may be interesting to mention that the lantern roof is constructed exactly in the manner to be hereinafter described, solid wood angle being used for the body of it. The top of the lantern is a shaped wooden cap as sold by Hobbies, covered with roof

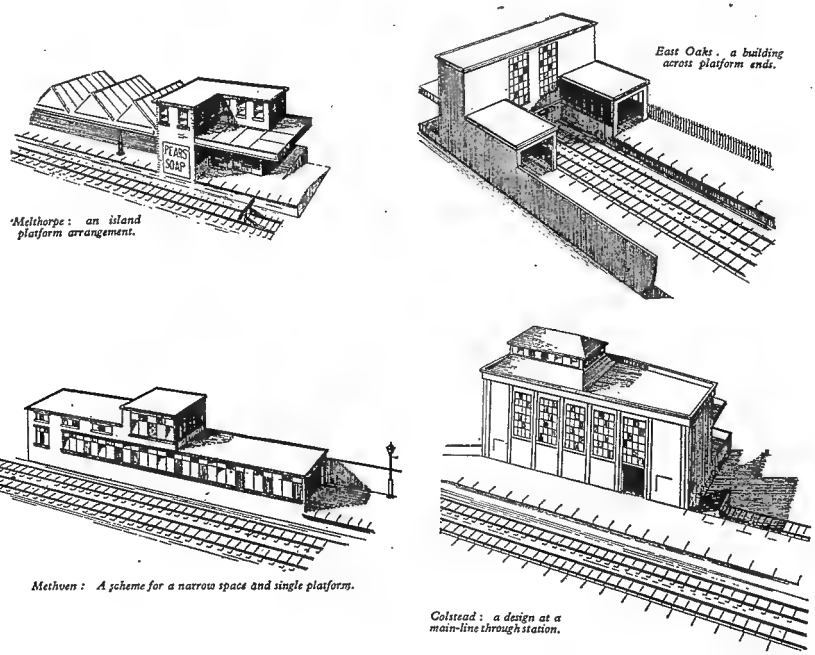

PEARS SOAP
Melthorpe: an island platform arrangement.
East Oaks. a building across platform ends.
Methven: A scheme for a narrow space and single platform.
Colstead: a design at a main-line through station.

FIG. 61.—Four Recent Station Buildings on the West Midland

paper. There are two platforms also at East Oaks, and the entire station edifice is erected across the ends.

Mention has already been made, in connection with the rectangular running shed, of the formation of roofs from solid wood. In Fig. 62 are given a number of ideas for different types of roofing thus built up. The first is the common type of cross-span platform awning, where the angle used is an obtuse one; before the war it was possible to obtain this kind of angle-strip from Model Structures Co., of Santa Cruz, U.S.A. The valancing in this instance is produced still by G. N. Slater, of Timperley, and is complete with guttering. Note the cardboard surfacing of the wood angle-strip, which is an invariable feature.

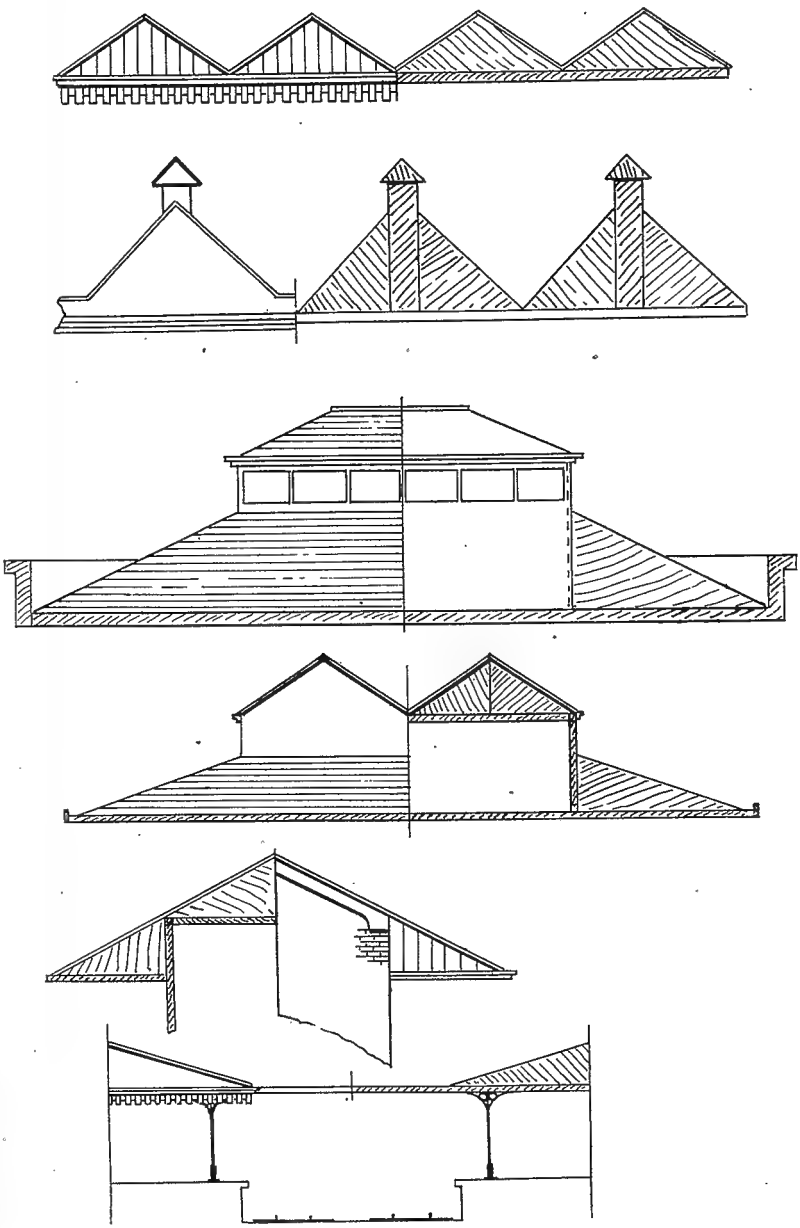


FIG. 62.—Useful Methods of forming Solid Roofs

The locomotive shed type, coming next, has already been described. In the third diagram we have a lantern roof of the type installed at Colstead (W.M.R.). The windows are formed on four small sheets of thick celluloid which occupy the whole interior surface of the walls. The angle-wood is again an American product, and is mainly intended for the use shown in the next drawing, which depicts a double monitor roof, and in the next, which shows an island station building. The final diagram shows a common form of awning used in Scotland, in which the girders cross the tracks and act as bearers for the awnings. The solid wood method is especially adaptable to this scheme.

I have elsewhere written so much on the subject of platform furnishings that it is not proposed here to venture broadly upon the theme, excepting to mention that the firm of Modelcraft have in the process of publication a full series of useful buildings such as those shown in the four sketches which follow, designed in card-sheet form, printed in full and effective colours for OO-Gauge. The platform fencing already on the market is the first example of this series. The bookstall is a particularly attractive item, being complete with newspapers, and having a polished pitch pine woodwork finish. At the precise time of this writing, only one of this series has so far been placed on the market—the platform fencing sheet ; but as soon as the way is clear of paper-restrictions the remainder will be available.

One other item comes under our present survey—that of a suitable standard type of platform footbridge. There are, of course, many possible designs for such a feature, and in various places I have dealt with these. But the most modernistic style is the reinforced concrete structure, which unfortunately happens to be the most difficult for the amateur.

For many years I was under the impression that the construction of a footbridge was a very simple job ; but there is possibly nothing in the way of railroad architecture that is so full of mathematical and practical difficulties. Of course, the common type of bridge with solid walls offers little in the way of constructional problems beyond the securing of symmetrical steps. But the moment the side walls are eliminated and the walls have to be shaped for the stairs and the steps have to be constructed within a maximum height-allowance (for OO-Gauge) of about 3/32-inch or less, the trouble starts. Indeed, if you are rigidly allowing for the steps and happen to know where these

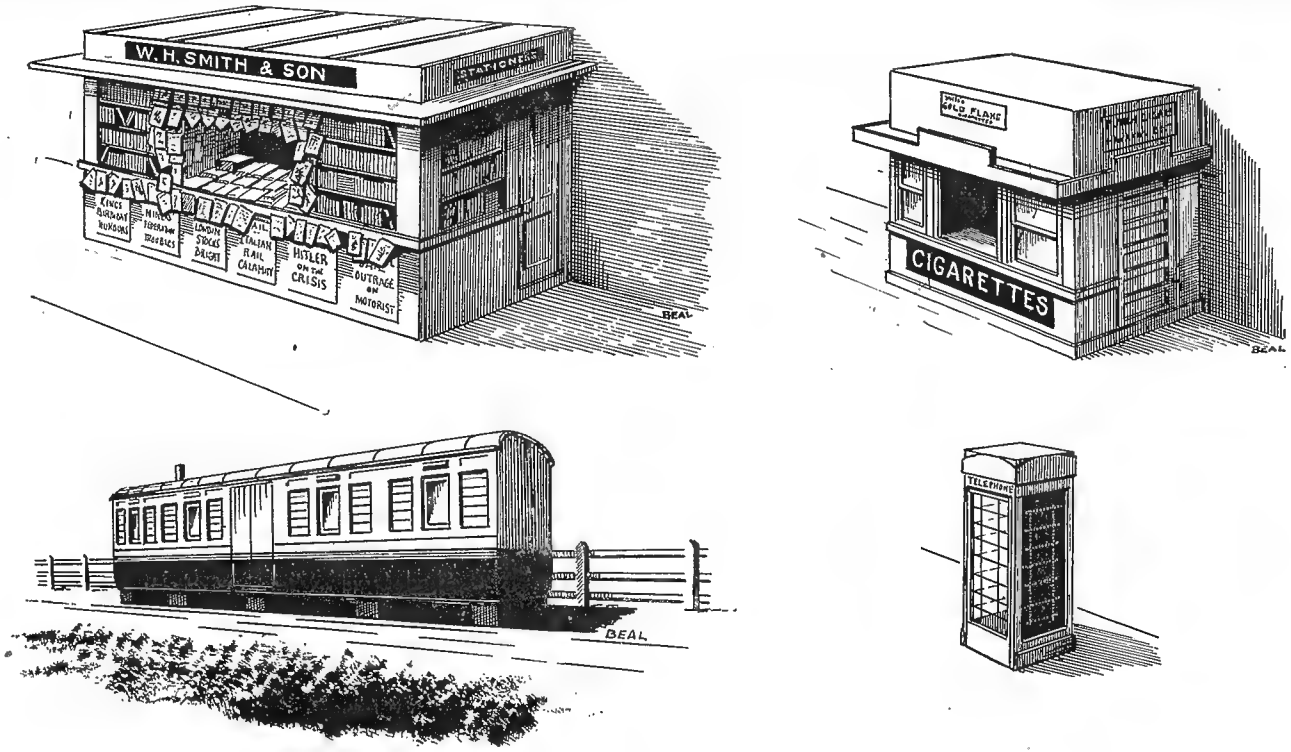



FIG. 63.—Station Furnishings designed by the Author, to be sold in Sheets by Modelcraft Ltd.

ought to occur, it is extremely hard even to draw an elevation of the subject.

But in the matter of footbridge design there are few indeed who are aware of the inflexible civil engineering rules which govern the matter. That is probably why we see so many models of bridge stairways about 20 feet long without a break at the centre ; and few things look less convincing. Footbridges require to be provided—or, in their place, subways—at all stations of the slightest importance ; their stairways must be no narrower at any point than they are at the top, so that if two stairways each 6 feet wide lead into a single stairway at a lower point, this stairway must be 12 feet wide. No kind of fixed obstruction is allowed on such stairways. Steps are required to have treads at least 11 inches wide and risers with a minimum of 7 inches. Furthermore, if the height is over 10 feet there must be a midway landing or break in the ascent. This is not merely provided to rest the limbs of climbers, but is necessary for public safety in the case of a suddenly hustled crowd.

The question of the midway landing is one which rather closely concerns the modeller, for in the instance of the normal footbridge which takes its rise from a standard platform in a station, the height required to raise to the clearance-line of traffic under the bridge is almost invariably over 10 feet. There may be existing bridges passing over railways where the ascent is made in one unbroken length of stairway, but it is almost certain that these are either the property of other than railway authorities, or else they are very ancient structures. Instances of a straight climb may also be seen in such locations as that shown in the drawing (A) ; but here—the instance being an actual one near Glasgow—there is a depression of the tracks to make it permissible. But in case like that of B, the midway platforms should always be included. Sometimes the stairway is given a midway twist which renders the platform rather less obvious, as on many of the pre-cast concrete structures on the Southern Railway, one of which forms our subject.

The example is shown in the head-sketch ; and although, as I have said, it appears a very straightforward job, the artist who can build it decently in OO-Gauge scale deserves to be called a railway modeller as distinct from a " model railway enthusiast." In the sheet of drawings some effort has been made to furnish details and provide hints which might be valuable. In the top two drawings we have the general front and end elevations.

Midway down the sheet there are suggestions for building up the stairways; and below these there are accurate templates for shaping up all the requisite parts, by means of the scale.

The stairs are the main difficulty, and the builder is strongly advised to avoid attempting, unless he is a past expert, to form these steps by cutting side-treads and fitting in individual risers and steps. It is far easier and equally satisfactory to work with solid wood consisting of $\frac{1}{8}$-inch by $\frac{3}{8}$-inch stripwood. I am fully

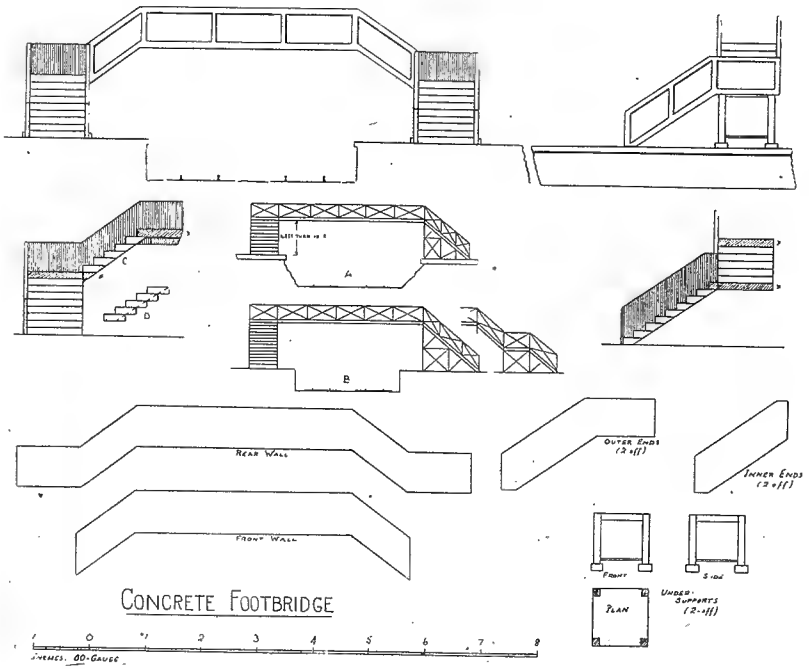



FIG. 64.—Concrete Footbridge

aware that this gives steps which are about a millimetre too large both ways, but I am purposely forgetting about it, for the deviation is extremely slight and the steps are small enough in all conscience. By consulting the drawing (C) it will be noticed that the deck of the bridge and the midway platform also consist of $\frac{1}{8}$-inch stripwood, and that the ends of these features also serve in each case for a step. Begin by cutting the pieces off the smaller stripwood, precisely square and 1 inch long. Of these, twenty-six are needed. They should be formed into stairs by gluing as shown at (D). When one of the eight-step sections has been made and is firmly set, the others can easily be made

by using it as a template or mould. Every step must be a stout adherent of its neighbour, particularly when the glue is hard ; and the sides of the completed sections should be absolutely straight—the latter being secured by pressing them when half-dry on a flat surface. When the sections, four in number, are indeed firmly glued and dried, each should be rubbed gently on sand-paper until the portion outside the dotted line is removed and the resulting surface is perfectly square and smooth. Next cut the deck and the midway platforms, with absolutely square ends. There are indicated in the drawings by cross-lines and are marked (X). The shape of the landing can be ascertained by consulting (C) and (E) together ; there is a corner to be cut out and one edge (the back) to be chamfered.

Now begin to cut from your cardboard or fine plywood or fretwood the walls, in accordance with the templates given. One rear wall, one front wall, two outer ends and two inner ends (for want of a better name) will be wanted. The deck should be long enough to project 1/16 inch over each end of the straight base-line of the rear wall, and it should be fixed, not flush with the bottom edge of the wall, but $\frac{1}{8}$ inch higher. This can be done by inserting another piece of stripwood below it. It would also be as well to insert yet another piece (this time 1 inch square section) above it. Now you can press and even pin the glued edges of the deck firmly and rectangularly in place, between the baek and front walls. Next fit the two upper flights of stairs, this time flush with the bottom edge. Next, the midway landings.

The two under-supports may now be made as shown, and this alone is a ticklish job. For the lower braces use thin wire, or a household pin if your stripwood will take it. Notch out the corners of the top plate for the four legs, which can be expedited in the act of gluing perpendicular by using a block of stripwood as a guide, placing the plate flat on the table and gluing two legs in at a time. The feet are not too difficult. When the supports are completed, glue them in place under the landings, leaving space for the lower steps.

The lower stairways are the next task. Care should be taken to get the lower ends of the walls true to each other, and the walls themselves can be glue squarely by again inserting a block of stripwood. Very fine " dolly " pins are handy for strengthening the joint of walls and steps, and also for passing through the lower corner of the wall at the upper end, where the pin is forced

into the projecting step of the midway landing. The walls themselves, when assembled to the main structure, serve to make the whole rigid. If I myself were building the model, I would attach these walls at the corners, to the main front and rear walls, with adhesive tape, which does not show conspicuously through concrete paint, with which the entire model should be coated.

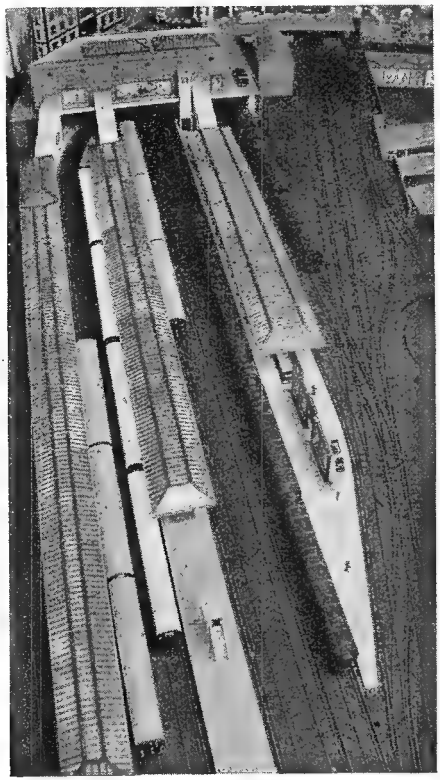
The outer panelling is executed in thin card strip, and I would strongly recommend for this purpose the Microstrip card as supplied by G. N. Slater, of Cheshire. This is ready cut and glued to what are indeed microscopic widths—1/16 inch is actually required. The top edges of the walls throughout the model may be smoothed with sandpaper before painting.

## PASSENGER AND FREIGHT PLATFORMS

The fixing of the height of platforms in goods and passenger depots is not by any means a haphazard affair ; the whole of the dimensioning of the erections round about railway tracks —real or model—is a matter of great importance. Nor is it true, as many a beginner may assume, that in the case of goods or passenger stations the height of platforms is identical. Passenger platforms are required as a general rule to come exactly to the level of the under-step of coaches, while for goods traffic the requirement is that platforms or banks shall be in line with the top of the solebar of standard vans ; certainly not higher for normal usage, but a certain latitude is allowed within the limits indicated. At all events, between the heights of passenger and goods platforms there will be a disparity of about a foot, though at a few way stations in Britain there are passenger platforms considerably lower than the height stated. In Fig. 65 (A) and (B) will be found diagrams illustrative of these details and contrasts. The widths (minimum) of passenger platforms are also shown. For a country station the deadline is 7 feet, for any larger type of depot 12 feet. The standard of clearance for buildings and awning supports is 6 feet between the edge of the platform and the erection.

Passenger platforms are not as a rule built with straight walls from top to bottom, but have top edges projecting at a distance of 1 feet beyond the wall itself. The upper walls are corniced as the diagram indicates, and it may be remarked that

suitable cornicing in 2-inch lengths can be had commercially. A good scheme is to make the platform, if solid, $\frac{1}{8}$ inch lower than ultimately required, and to use blind-lath for the surfacing, which has a nicely rounded edge, under which a two-step moulding can be fitted. This is shown in (B). There are also definite rules as to the placing of sloping ramps at platform ends in



An Aerial View of Excellent Platform Work on Mr Vacy-Ash's North Central Railway (OO-Gauge)

passenger stations, and as to the gradient of the ramps. For OO-Gauge modelling purposes a length of 3 inches has been more or less established. Speaking of solid platforms leads to the question of their desirability over hollow, or built-up erections. There is no doubt that for the smaller standards the solid structure is by far the best, cheapest and most readily made. For O-Gauge, where operation of points and signals is often by means of rods and cranks, there are distinct advantages in the platform which

is hollow underneath, for the rods can be thus concealed in many instances while still being fitted on the surface of the baseboard. But for HO- and OO-Gauges, where other methods of point-manipulation are used, this is not an important matter, and the

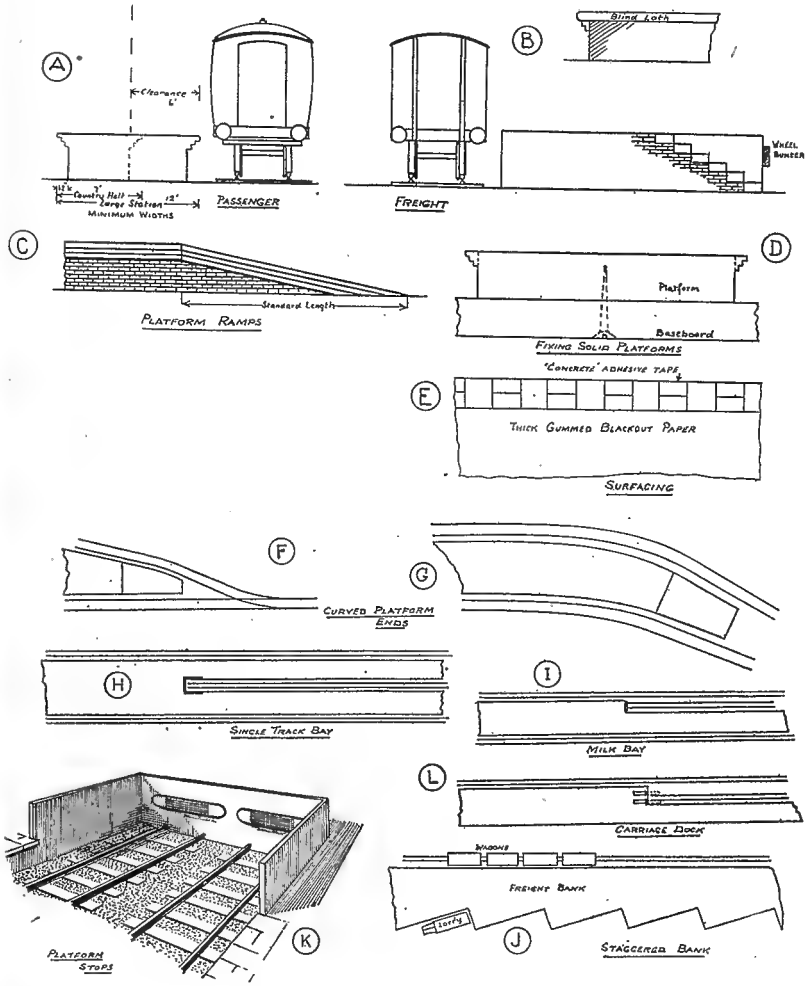



FIG. 65.—Passenger and Freight Platforms

writer has found that the best method of obtaining platforms is to have them cut and trimmed out of soft wood by any local joiner, who will shape the curved ends and the ramps without trouble. Mouldings can afterwards be fitted easily by the amateur himself. In (C) we have the standard type of ramp,

which must be fitted at every open end of any passenger platform ; and in (D) we have the best method of fixing down the solid platforms, whether goods or passenger, to the base.

The surfacing of platforms is also important. For freight traffic, concrete may often be employed throughout, and will be found most advantageous from the standpoint of finish. But, if desired, the side walls may be bricked while the surface is finished as concrete. (B) shows the correct method of dimensioning and forming steps for goods banks, varied lengths of stripwood superimposed on each other being employed. Note that the steps are concrete, and that at each outer end of a step a small piece of adhesive tape, coloured for concrete, represents the end of the concrete block forming the step. For road vehicles, the wheel-bumper along the outer wall is also an indispensable item, and consists of a length of painted stripwood. As for the surfacing of passenger platforms, consult (E). Here is given the method which, after years of experiment, the writer has found most admirable. The surface is first covered with thick blackout paper of the gummed variety, which can be bought in rolls about $4\frac{1}{2}$ inches wide and of almost unlimited length. This material sticks handsomely if wetted with a soaked sponge, and should be laid on without a break, if possible, for the entire length of the surface. The concrete, or pavement edging is represented by unbroken strips of concrete-painted adhesive tape, which can afterwards be marked out as a pavement with a soft pencil. The tape should be bent and stuck down over the rounded edge of the surface.

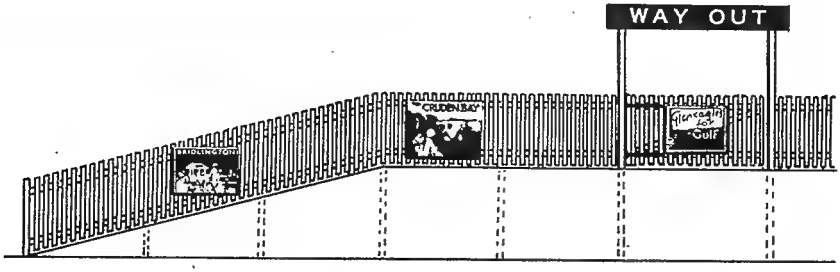
Mention has been made of the necessity of curving the ends of certain platforms, and this is essential of course where the tracks themselves are curved. In (F) and (G), Fig. 65, two examples are given, the first involving, as is commonly the case, one edge curved and the other one straight. In (G) we have both edges curved ; and, it goes without saying, it may be that entire platforms will require to be so shaped if the station is located on a curve.

At many stations, both in the country and of a larger type, there are various arrangements in platforms known as " bays." Most notable are the ordinary long bays commonly installed for the use of local traffic in through stations, which are constructed for both single and double tracks, more often for the former. The inner ends of these bays are often walled in with the type of buffer wall shown in the plan (H) and in the sketch

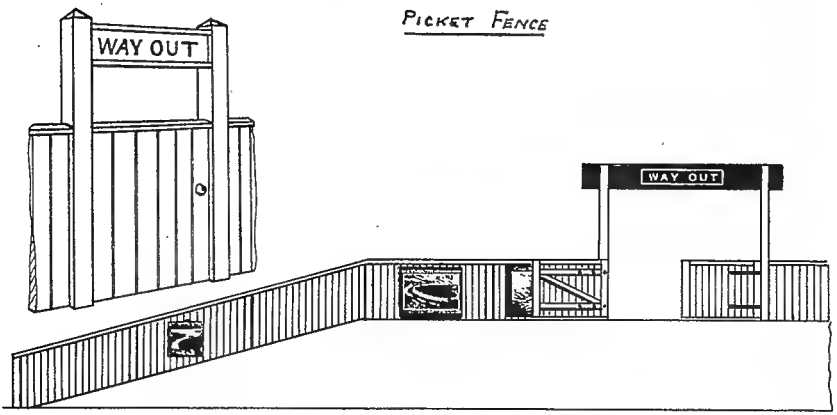
(K). Milk bays are a regular feature of most country stations and many town and city depots, and usually consist of an inlet section with a very short length of track into which milk wagons are shunted ; they generally occur at the outer ends of platforms used for local traffic. For horse-and vehicular-traffic a carriage-bay is often used ; and this has its end fitted with lifting, hinged running-plates which can be thrown over to fall over the buffers so that vehicles can be pushed into vans fitted with end-doors, or on to open carriage wagons. In the diagram (L) the scheme is shown.

A very modern method of forming loading banks at goods depots is that indicated in (J), where the platform edge is staggered on its highway side. This affords access to a number of motor or other lorries within a very much conserved spacing and provides for greater convenience in the movement of these vehicles as they are loaded. It is very desirable especially where the front clearance is restricted, for the road vehicles can be backed in through doors of the normal dimensions, and a normally spaced single roadway inside the shed is sufficient. It should be a scheme particularly applicable to a model layout.

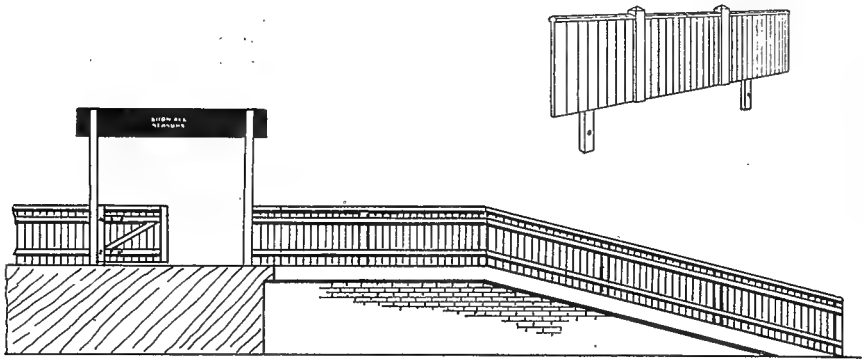
The fencing of station platforms is an item which, in the miniature scales, has hitherto been amazingly neglected by the commercial houses. Yet it should not be at all a difficult matter to provide for this facility. The writer recently designed for Modelcraft Ltd., a series of card-modelling sheets, one of which provided a buff-coloured board-fence for platforms and ramps, complete with miniature advertisements. This particular feature is now on the market and may be had from Hamblings. The type of fencing embraced in that design is identical with the old example which used to be sold for the larger scales by Bassett-Lowke, and which is illustrated in the two small sketches, one of which shows a typical gate. The Modercraft fencing allows for a full covering to the outer wall of the platforms in the form of brickwork. Of course, the ideal platform fencing is the picket type, as illustrated ; but until quite recently this has never been obtainable in any truly realistic style. To be accurate, there must be more pickets than daylight in this fencing. G. N. Slater, of Timperley, has recently produced this form in machined card-strip, and it looks admirable, though possibly the ramps would have to be specially ordered. The bar fence is rarely used for platforms, though it has its other uses on a layout and is not difficult to make. The rail fencing shown is also simple to model,



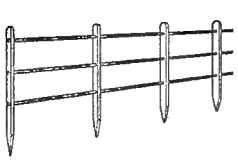

Picket Fence



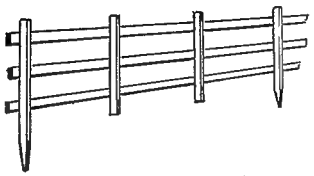

Modeltraft Fence (Platform Side)



Modelcraft Fence (Outer Side)



Bar Fence



Rail Fence

FIG. 66.—Platform Fencing

and it may be observed that to bring all the posts down into the baseboard is not necessary ; intervening ones may be merely carried down to the baseboard surface.

An item hitherto quite neglected by manufacturers, and rarely included by amateurs on their layouts, is that of a suitable form of station wall, representing the railway company's boundary, and giving a finish to the scene. It is good to be able to state that one of the Modelcraft card-sheets includes a somewhat attractive example of brick boundary wall and gates, a sketch of

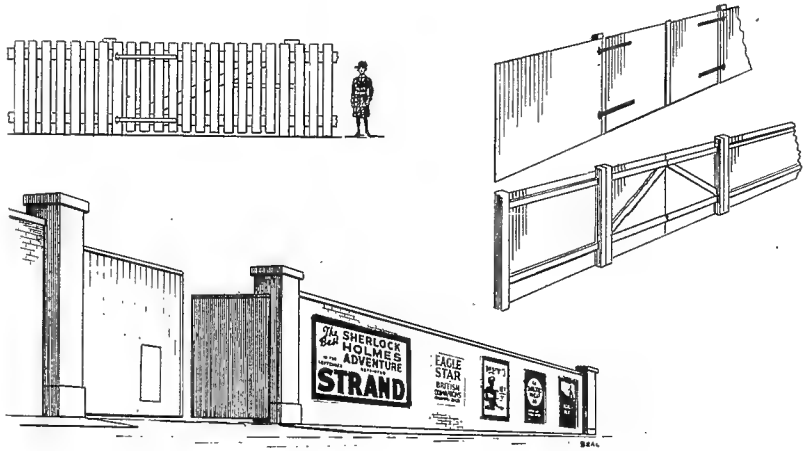
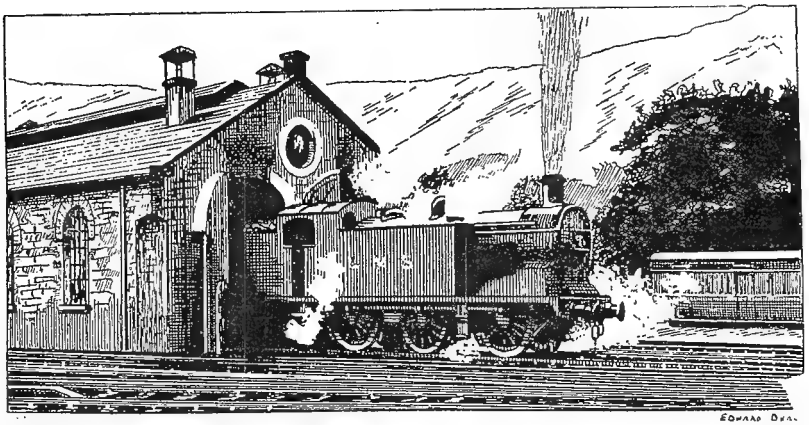



Fig. 67.—Walls and Sleeper Fencing for Station Yards

which is given in Fig. 67. For the benefit of those who wish to model their own examples, two other designs will be found in the same figure, representing a sleeper-built fence and a corrugated iron wall and gate for this purpose. Excellent corrugated iron, fashioned to scale from metal foil, can be had from G. N. Slater, of Timperley. Given this material, the construction of this item is a very easy task, and nothing looks more satisfactory than such a fence, if so desired in an unpainted finish, though the woodwork framing should be given a coat of creosote or diluted Indian ink.



## FREIGHT SHED DESIGNS

AMONG recent designs for freight shed models for OO-Gauge layouts, the item shown in the sketch will be of interest, showing as it does the style of the new Modelcraft card-sheet designed by the author, as it makes up into a typical small country shed. It is modelled with open doors as shown, and represents a buff-coloured timber structure, arranged to span a single track, with a cart platform on the outer side. There is an office building, and miniature advertisements are included.

The freight shed design given in Fig. 68 will be found novel and effective for any existing O-Gauge or small scale layout where there is an available space abutting on to the background ; for OO-Gauge this space should be 15 inches by 5 inches, exclusive of track approaches and clearances, and for O-Gauge a site about 26 inches by 9 inches would be necessary. The idea is to arrange the shed at a point where the backscene is of the " warehouse " type and would naturally fit in with the main feature, the shed itself. The height of the OO-Gauge model would be about 7 inches, and for O-Gauge about 12 inches.

The construction is very simple, and we will describe it as for the smaller scale. The walls may be cut from plain white cardboard sheeting about 1/16-inch thick, the window-and door-spaces being first marked out and cut with a razor-knife. Care should be taken to make the cuts perpendicular and not at an

angle. It would be good to obtain the windows before the work begins, and to see that the apertures are dimensioned exactly to fit. There should, when the windows are in place, be a white strip of sash showing all round, but there should also be an allowance of overlap behind the aperture sufficient to retain the windows firmly in place. There are eighty-four of these windows in the model.

When the spaces have been cut the building should be given one coat of dove-grey concrete paint before the walls are assembled. The paint should especially be applied to the edges of the window

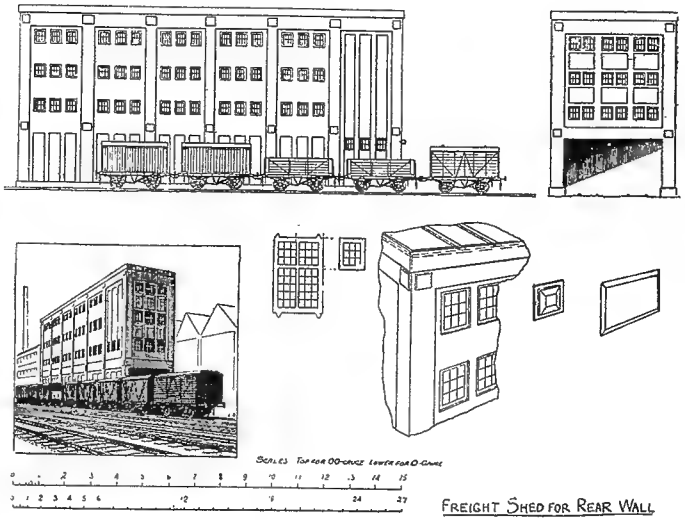



FIG. 68.—Freight Shed for Rear Wall

spaces and door openings, and when it is dry the windows are the next job to fit. This work is done by coating the celluloid with glue and retaining the backs of the panes with strips of adhesive parcel strip. Next cut the recesses on the lower part of the front wall. They are completed by fixing a backboard along the entire length behind. The outstanding piers or plinths are formed by cardboard or thin wood strip stuck on the surface. The small ornamental squares which project along the top and near the centre of the walls may be formed from the small square wood mountings obtained from Hobbies, or may be made from card squares. The chamfered panels at the ends are also made from thin fretwood with trimmed edges. The roof is inset in the recess formed by the projecting

parapets and is provided with imitation lead rolls, for which stripwood may be employed. Medical applicators (thin round strip) are also suitable. It would be well to paint the flat roof lead colour before fixing it in place ; otherwise it is impossible to make a clean job of the painting at the edges.

The four walls should be joined together with parcel strip before the outer piers are glued in place, the piers then fitting over the top of the strip of adhesive paper. A gap of 1/16 inch must be left between each wall to allow for the bend-over. After fitting the roof, fit also a floor just above the top vehicle clearance

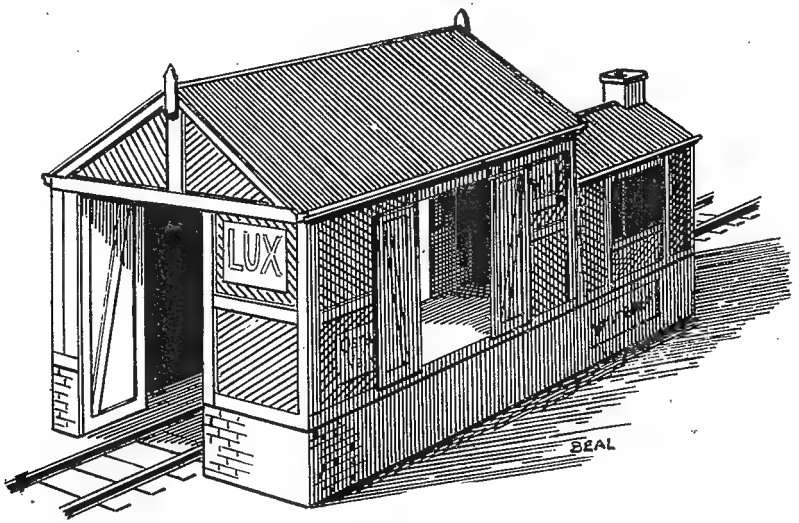



Fig. 69.—Modelcraft Cardsheet Freight Shed by the Author

mark, to give strength to the structure. This should be a tight fit, with edges glue-coated. When assembled, the projecting plinth around the base is the last constructing job. The corners of the plinths may be strengthened on the outside with parcel strip to hold them in place against wear and tear.

The last task is to give the outside walls and the inside visible parts a second coating of concrete paint, and the result should be a very realistic and imposing, as well as a durable, model.

For O-Gauge a thin fretwood may be used throughout in place of cardboard, but the work is otherwise exactly similar.

The third design (Fig. 70) is something of a departure from

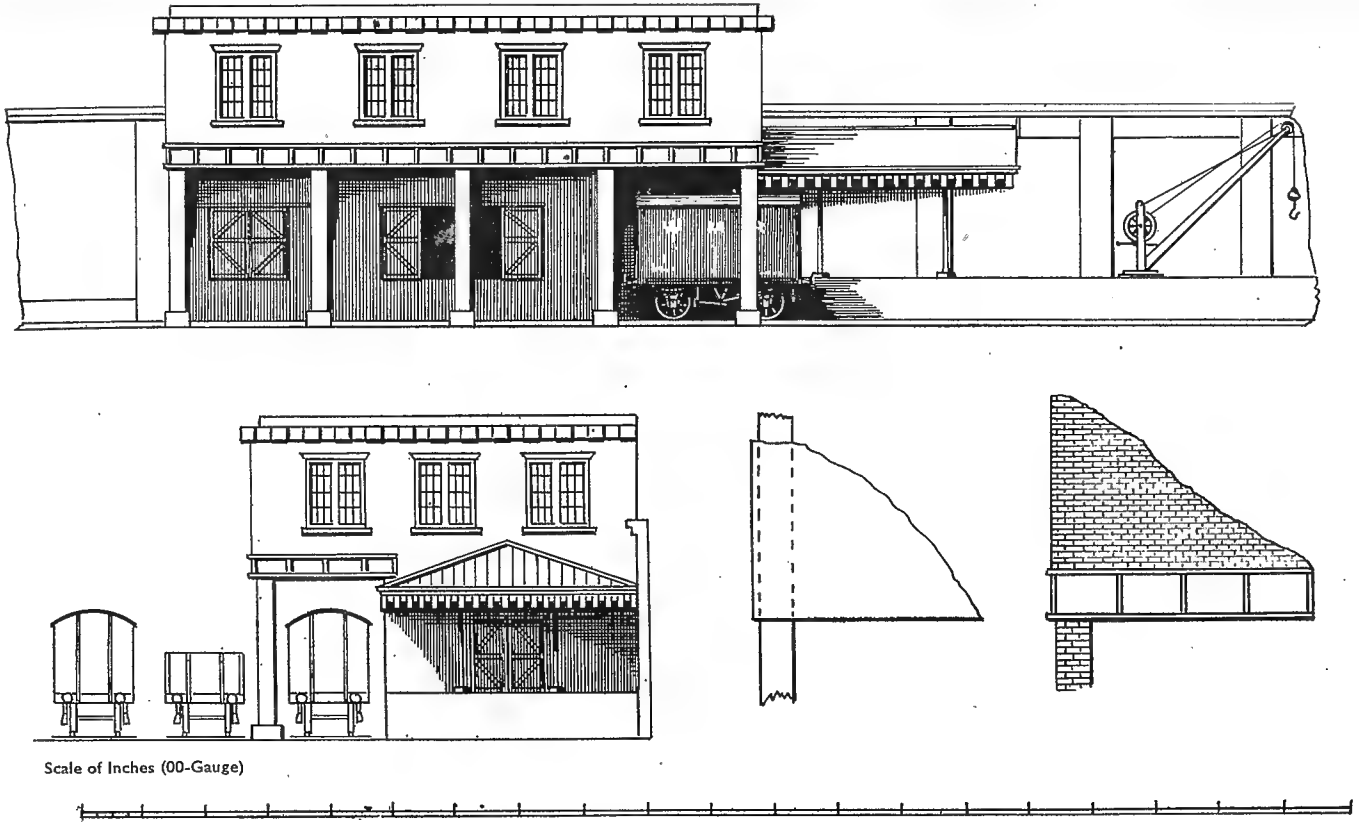



FIG. 70.—Goods shed for OO-Gauge

the usual, comprising a shed projecting over a goods siding, having a roofed extension over a loading bank at one end. The main building is simple enough, the only outstanding feature being the imitation steel girder resting on brickwork columns or piers. All of this work is executed in cardboard with stripwood for the columns themselves. The face of the girder is simply the face of the cardboard wall, brickpaper being here omitted, and the joints and edges of the girders being represented by card-strips glued on the surface. Use only a thin coating of glue, and see that it does not spread on to the work. The columns extend to

Prototype Goods Shed at Dunmow on the Southern Railway

the very top of the walls inside the building and thus serve to strengthen the corners. The windows are of the usual celluloid kind but should be lined to show small sashes. Awning supports may be had commercially for all gauges, or may be easily soldered up from wire or rail. The ornamental cornices are most effective on a building where they are painted for concrete, and they are obtainable in 2-inch lengths from Slater, of Timperley. The awning valance is from the same source, as also are all the doors.

For builders who prefer a span-roof building there is a photo of the actual shed at Dunmow on the Southern Railway—a picture which reveals a number of interesting items for the designer. In Fig. 71 will be found a complete design for this shed,

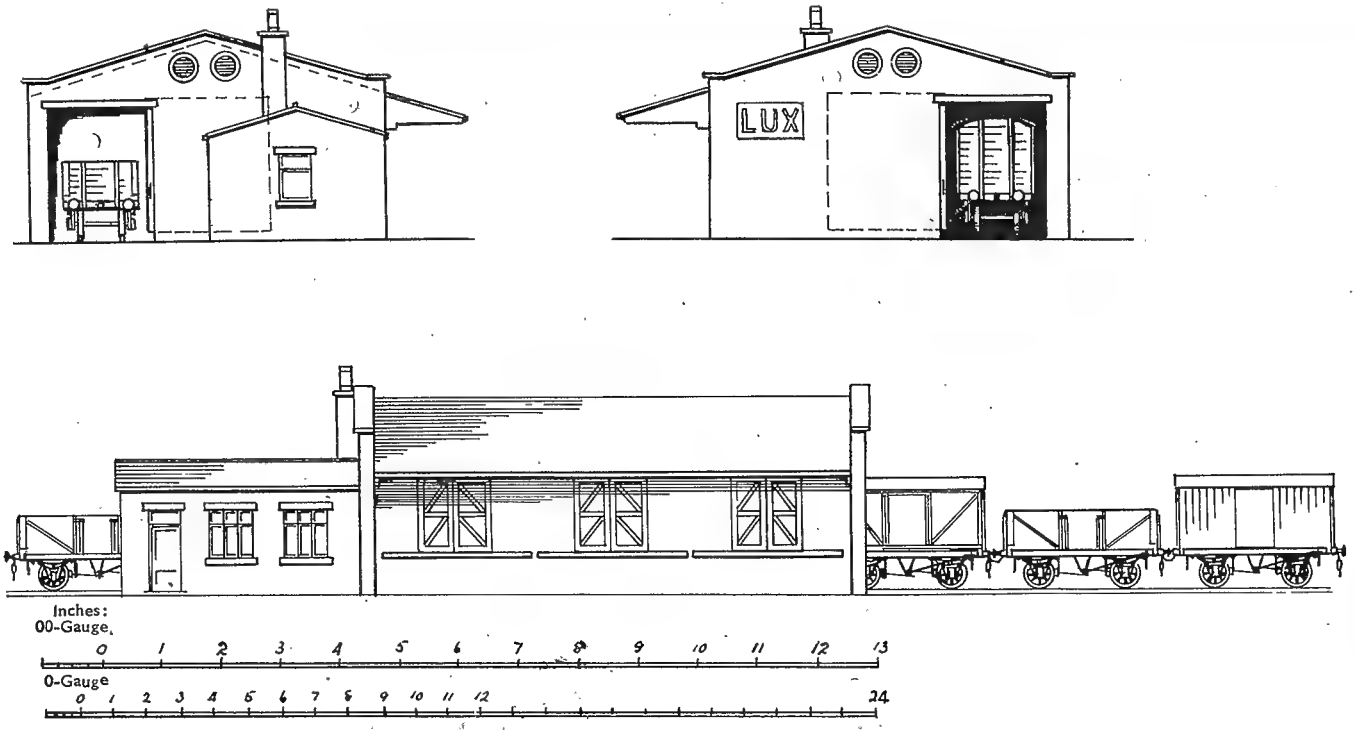



FIG. 71.—Design for Goods Shed at Dunmow

dimensioned for both O- and OO-Gauges. A further photograph illustrates the goods depot at Laurenceton on the former West Midland.

## A DOCKSIDE FREIGHT SHED AND CRANE

I am not aware of having put out during the last twenty years a design for a goods shed suited to a small wharf or riverside location, and such a feature provides a most attractive and

Goods Depot at Laurenceton on the former W.M.R.

fascinating item on a layout. The main requirement appears to be that the total space occupied shall be as restricted as is compatible with a correctly arranged depot. The scheme I am about to outline is suited properly for OO-Gauge, but there is no reason why, on an O-Gauge system where space is reasonably available, the same designs should not be used.

The general style of the model will be gathered from Fig. 72, which gives the front and end elevations ; and there is also a perspective sketch of the equipment. The shed itself has purposely been kept as low and as small as possible, the restriction in height serving to keep down the total clearance of the crane and gantry. The model is faithfully based on an actual example.

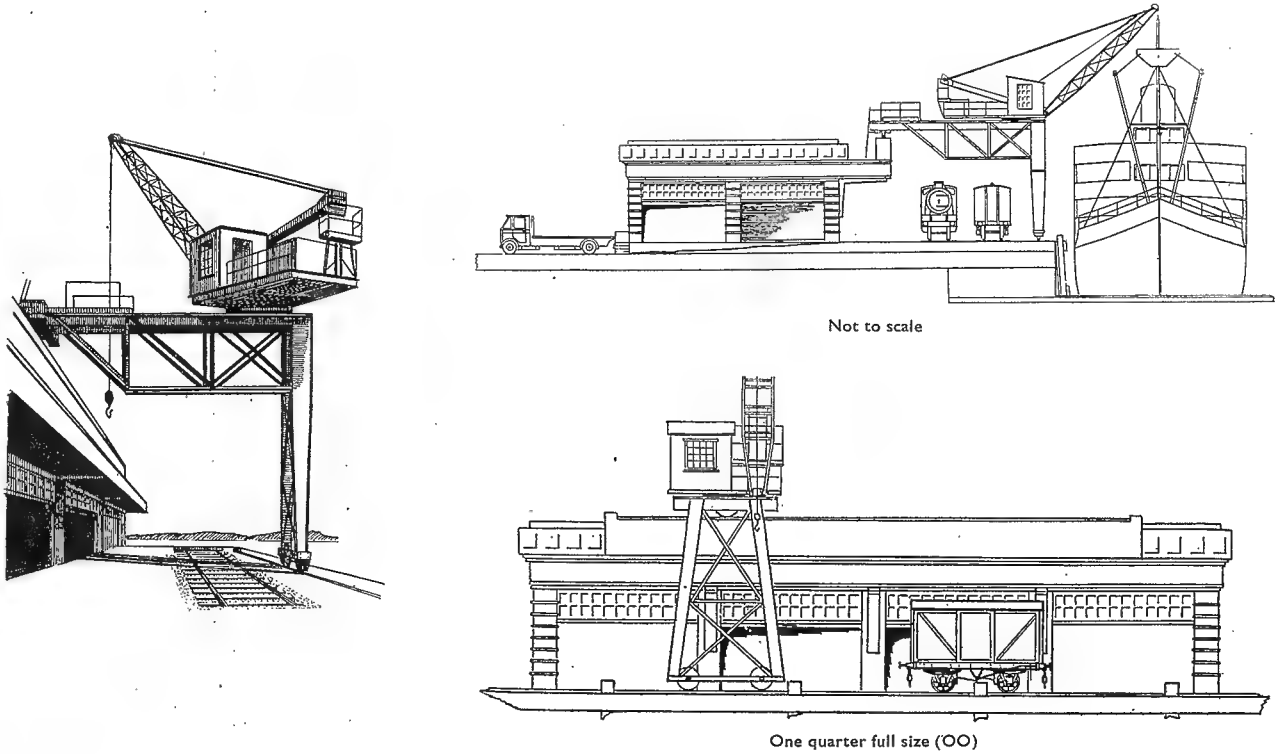
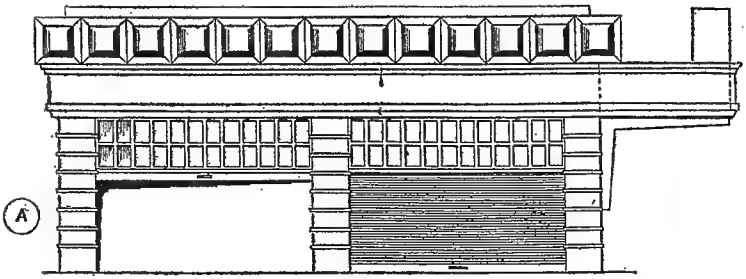


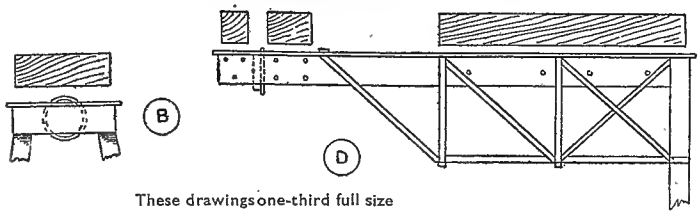

FIG. 72.—Sketch and General Design for Dockside Freight Shed

The crane itself may of course be merely a spectacular model, though there is no reason why it should not be arranged to operate either by hand or electricity. The gantry may in any event be made to travel and the crane to swivel on the gantry ; though it is doubtful whether further details of operation are particularly acceptable from the standpoint of handling and discharging loads from ships. What is mainly needed is a realistic and convincing depot at which trains may arrive and from which they may depart—one that is reasonably simple to model and that will fit into a normal freight yard locality. I think the designs will meet these demands.

The total space required for OO-Gauge, allowing for a cargo vessel of about 3 feet in length would be 3 feet by 28 inches ; but if smaller lighters were substituted this could be reduced to 28 inches by about 18 inches. The feature could fit into a peninsular baseboard 3 feet in width and still allow for a passing double main track. The end elevation shows also the substructure of the baseboard and the formation of the dock basin, work that is simple in the extreme and requires little comment. The underside of the basin is of plywood attached to battens under the main base, to give the necessary drop of the basin. The surface of the latter is covered with common sheet glass on a surface of dark brown paper which may or may not be painted. A little green sawdust sprinkled under the glass about the edges provides a realistic effect. The building is in ornamental concrete of the modern order. Either one or two tracks may be installed alongside the wharf, and the outer side of the shed is available to road traffic. The shed is provided with imitation rolling shutter doors, which are as easily modelled as any type I know, are easily opened and shut, and always keep in working order. The canopy or awning of the shed on the dockside serves to carry the upper track of the gantry. The construction of the building, being ornamental, requires a measure of patience, but little else.

In Fig. 73 (A) we have an enlarged diagram showing details of how the building is formed. The first task is to cut the four walls from cardboard slightly under 1/16 inch in thickness. There are no tricky window apertures to cut ; the transome lights are all the windows there are, and the space for these is simply a continuation of the door space. The transomes themserves are formed from celluloid sheet, fairly stout, scribed with a harsh instrument and painted with white poster colour, which

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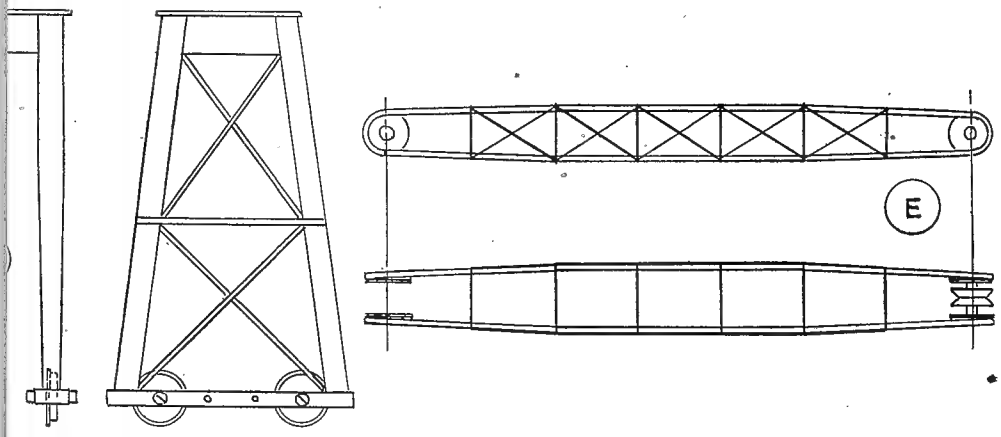


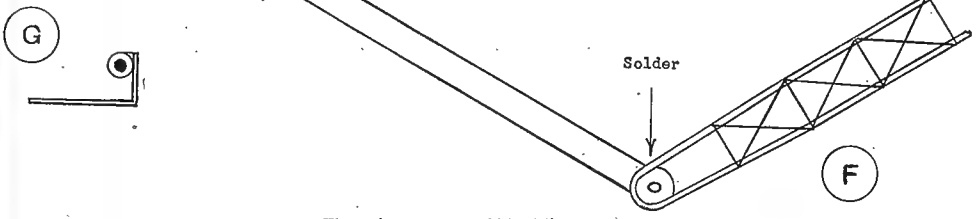


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FIG. 73.—Details for Shed and Crane

is wiped off dry when drying has taken place. Windows are fixed with glue and parcel strip on the inside, and the sashes should be an exact fit. A strip of cardboard is glued along the bottom edge of the transomes. The cornice which projects all around, and which extends to cover the edge of the awning, is formed of cardboard. The walls are joined together with strips of adhesive tape, neatly cut and attached. The awning itself is a length of solid stripwood glued and tacked in place. The concrete base for the gantry track is another length of stripwood. Mouldings may be made from strips of card. The ornamental facing-work above the cornice can be had in lengths from any shops dealing with Hobbies supplies. Before the windows are fitted the four walls should be given a coating of concrete paint, including the inner edges of the door and window spaces. Where the shutter doors are not required they may be substituted simply by block walls under the windows. Brackets for the awning can be had commercially in metal, or may be formed from two pieces of tapered stripwood.

We now pass to the gantry (Fig. 73, B, C, D). If I were making this myself I would use for the horizontal main frame L-section brass, and this is to be recommended. The soldering of the frame would be an easy matter and the side bars could more readily be attached in this manner. A wooden block would then be inserted (as indicated) at the points where this is required for the platform. But there is nothing to forbid the use of stripwood for the entire structure if this is preferred. The diagrams make all clear, I think. Three running wheels are provided—one for the upper rail, two for the lower. These are discarded wagon or coach wheels, the smaller the better; some HO-Gauge American truck wheels would be best. The upper wheel is slipped to run loosely on its axle which is forced into the two wooden blocks; the intervening side space will require washers. Notice that the main legs of the gantry are tapered below a certain point. With wood this will be simple enough; with metal they will have to be filed. The bearing frame for the lower wheels is formed of cage-bar, which is ready drilled. The wheels must run loosely, but must have no wobble.

In the drawing marked Fig. E we have the jib of the crane, which is built from cage-wire shaped as indicated, with lattice work of much finer wire. The best method is to form each side separately, of course, and then build up the jib by using inserts of stripwood. The pulley is a L.M.C. O-Gauge signal pulley.

Washers are soldered inside the ends at a slight angle to form good bearings. The balance-bar counterweight of the jib is shown in (F), and it may be made a fixture with solder where shown, though in the actual crane this is not so. The bearing for the jib itself is made from a small piece of brass tubing soldered to a shaped tab which is attached to the swivelling floor. The size of this floor and of the cab and other deck details may be had from Fig. 73. Pivots consist of small brass bolts and nuts. The rails for the running wheels are laid on short metal sleepers to which they are soldered.

The making of the shed doors is a matter of cardboard and

Goods Shed on West Midland Lines having solid wood roof structure

scribing, the latter done closely to suggest roller slats. There is a wider space at the bottom of each door to allow for the fitting of a lifting handle, which also serves to retain the doors from rising too high behind the windows when opened. There is ample space to receive these doors in the upper portion of the building. The last job is to give the whole of the shed a second coating of concrete paint, which should be flat-drying. The crane may be either black, grey or red. Care is needed in fixing the tiny strips of card which represent the ornamental concrete horizontals on the pier walls near the doors. This is best done by using a strip of wood for a "gauge" between each length as it is stuck in place. The shed roof is flat, and is painted lead colour. Medical applicators can be used for lead rolls. The roof should be painted before being fixed.

## A CARGO VESSEL FOR A MODEL DOCK

The majority of designs that have been offered for railway shipping seem to have failed by reason either of scale disproportion or the diminutive nature of the prototype chosen in order to avoid this snare. Yet there seems little cause for this drawback unless the model is designed to a scale by its very nature too large for the average indoor site. A model of a dock basin for OO-Gauge should at all events be capable of accommodating a vessel of 3 feet in length, and within this restriction it is possible to make a scale replica of a 6,000-ton ship. The design about to be given is itself the origin of one of the boats at present lying at their moorings in Melthorpe Dock on the writer's layout. Of these vessels there are two, and the sister ship is the same in dimensions though slightly varying in detail. One of the happy thoughts behind the creation of these models was that of making them in two halves, since they were waterline vessels only, in order to facilitate packing and handling; and this item is a great convenience. Indeed, the second ship was actually modelled in halves, and this made it possible to do the work on a card-table. The design for the vessel about to be described is given in this form in the two sketches, which should clearly show the method of forming the joint amidships.

The hull is cut from a piece of common deal, and was prepared along with several duplicates by a local joiner. It is simply a shaped block of wood with two square holes for the holds, the upper surface being given a slight rake, the bows and stern being shaped in the "straight-up-and-down" style. The more graceful cambering and tumble-home were given by making a cardboard form to cover the entire sides, and packing this to the desired style. The elevation and plan of the crude hull, and sketches of the formation of the sides are given in Fig. 74. For the attachment of the sides, a roll of 2-inch wide adhesive parcel tape was secured and the diagrams show the method of affixing this tape to the sides and underside of the hull. The beading was formed of narrow, thin card-strip. Here and there the cardboard sides, which are of about 1/16-inch thickness, were pinned to the woodwork, at points where there was no cavity behind. The holds were then lined with cardboard sheeting cut to the correct shape, and the uplifted battens were modelled as if stacked in piles.

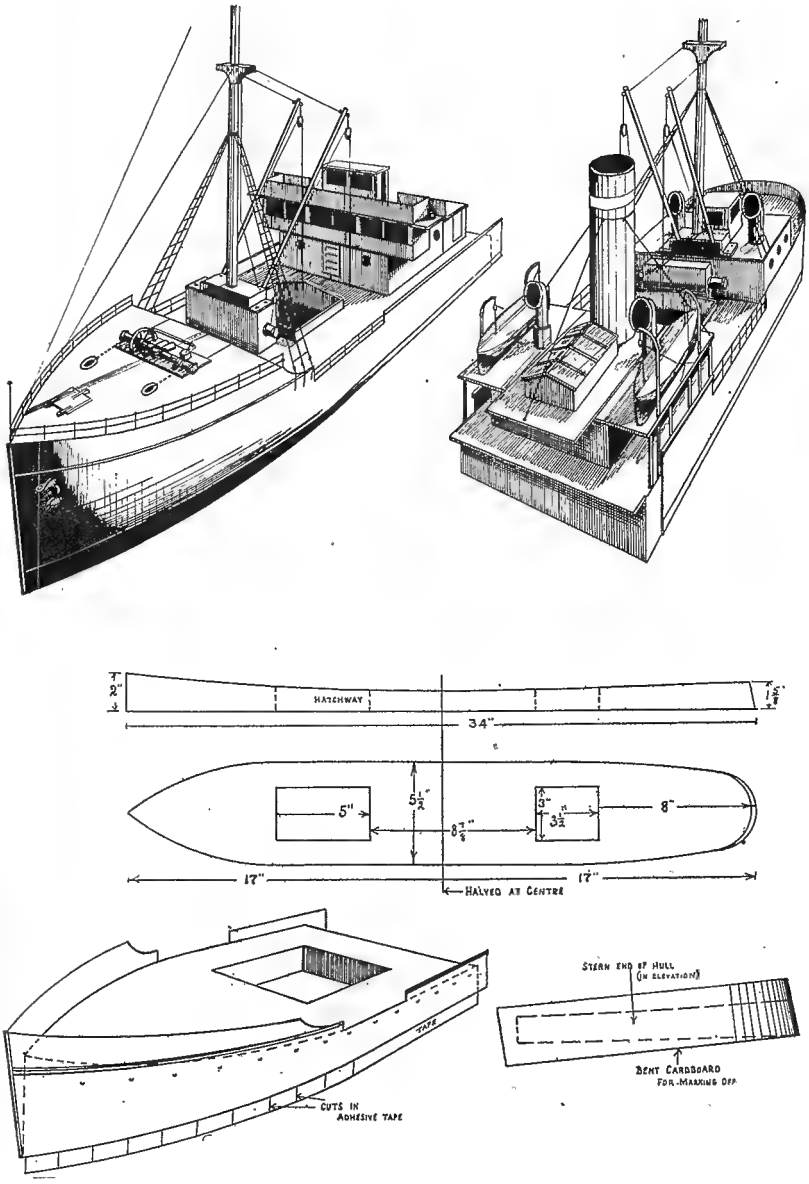



FIG. 74.—A Cargo Ship for a Model Dock

Fig. 75 gives elevation and plan of the finished model. It is about 33 inches in length by $5\frac{1}{2}$ inches in beam. The style of the bridge and deck houses can be gathered from these drawings and the sketches. Most of the structure comes from make-shift materials. The boats are cheap metal ones by Bassett-Lowke, as also is the whole of the staunchioning. The only expensive items were the deck ladders and the davits, which are such conspicuous features that I wanted to make a sound job of them. Deck columns are of medical applicators. Cheap metal vents are fitted throughout, and when thoroughly cleaned up and painted looked excellent. The hoist-winches are modelled as encased, which conserved much labour, though the sister ship

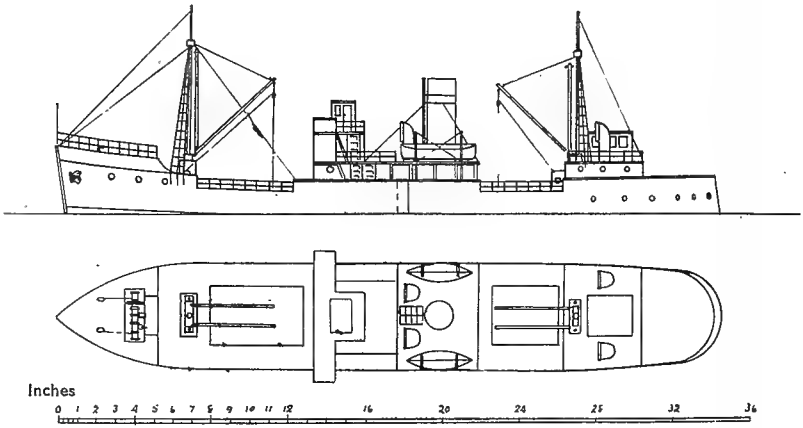
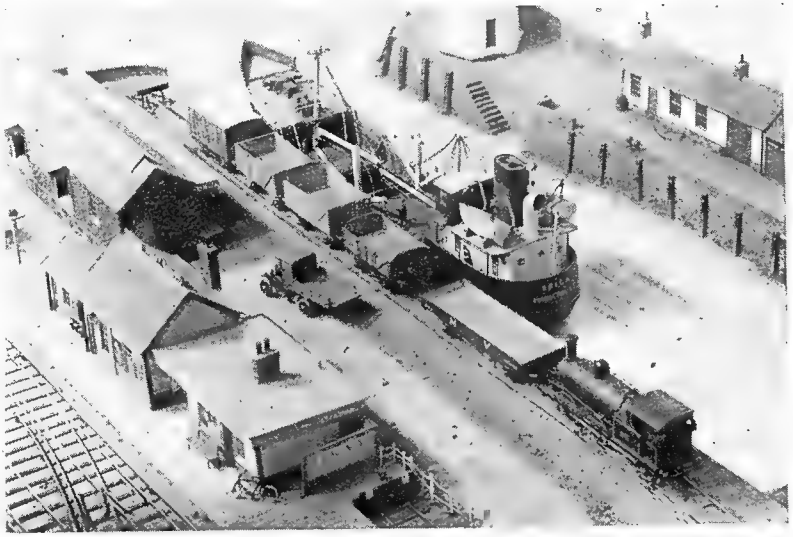



Fig. 75.—General Design for Dock Cargo Vessel (OO-Gauge)

has all winches visible. These, together with the anchor windlasses were easily modelled from all manner of scrap, including some discarded and very unrealistic metal cart-wheels, portions of wood locomotive funnel and air-cylinder and air-brake fittings from America, wire, pins, and (for a foundation) part of an L.M.C. O-Gauge signal base. Anchors and hawse-pipes were bought. The engine house skylight was made of card and celluloid. Shoe-eyes are used for the ports. The funnel was made from card in this instance, the second ship, however, having a commercial funnel which was quite a costly item, though I cannot say that it has a better appearance, the only feature being that it has a base that could be screwed to the deck.

The painting of the model was not the simple matter it would

appear. Few things are more difficult to paint realistically than a ship's deck. After several unsuccessful approximations to decency, a dark, yellow-buff paint was found suitable, mainly because of the fact that the dustier it grows through the years, the better it looks. Deck houses and bridge are white ; the hull sides are flat black, with red below the Plimsol line. The beadings are picked out in yellow, and masts are the same. Funnel is black with a yellow band and a diamond of yellow paper on either side. The grids for the mast bases were formed of



Mr J. H. Ahern's Cargo Boat at Madderport Dock

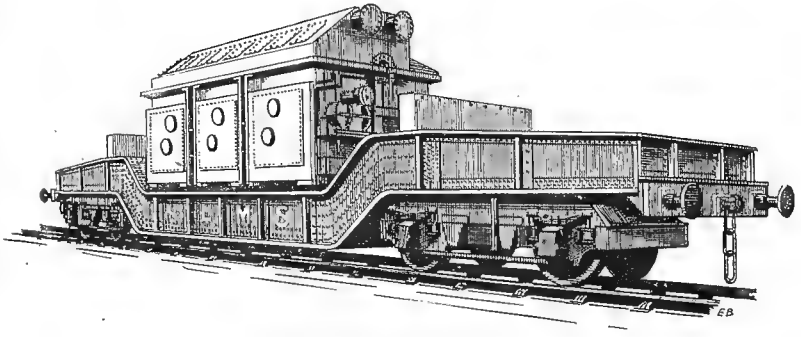
OO-Gauge rail sweated on to strips of tinplate, and the cross-trees, which are hefty for this type of ship, were made of card masks and stripwood. The bridge is glazed with plain-sashed opaque windows from America, the stern-side of the bridge ends being unglazed. The manhole on the forecastle is an O-Gauge American ice-box as used on American refrigerator car models.

The model is really such as any novice could make with careful fingers, but it looks as well as any feature on the layout.

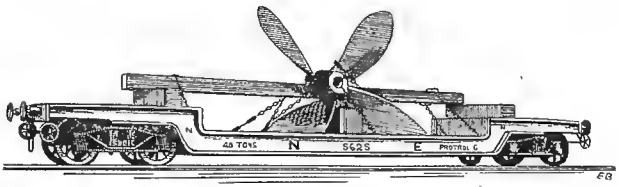
## FREIGHT LOADS

Next in interest to that phase of modelling which deals with freight wagon construction is the business of correctly loading the vehicles and of simulating loads with a degree of realistic exactitude. Actually, the correctness of the load, its distribution and its attachment to the vehicle are of equal importance to the work of wagon building itself, for it goes without saying that a well-made vehicle can be made to look absurd without this extended amount of care as to what is placed upon it, and how it is placed. Loads, moreover, have their function in various positions around a freight yard, where they provide an added and essential touch. Such freights as would normally be carried in covered vehicles like box, live-stock and motor-car wagons will have their usefulness confined to correct positions on freight platforms, for in the smaller gauges scope is rarely allowed for including loads in enclosed vans. We have therefore a twofold concern in modelling freights—first, the exact designing of the load itself, and secondly, the placing of the loads in position wherever they are required to be.

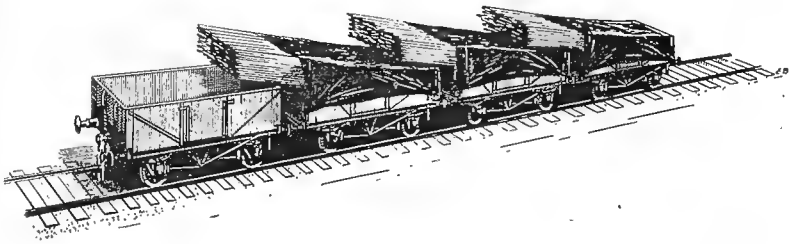
In modelling freight of all kinds there are several requirements which have no place in real railway practice. The load should, for instance, be clean to handle, light in structure, realistic in appearance, and capable of being removed or detached from vehicles as occasion demands. To these four features we may also add another—where a bulk load such as coal, gravel or slag is represented, the imitation should be incapable of spilling. Thus, if actually sifted coal were used to load open wagons, great worry would be caused by derailments in which wagons were upset ; and the moral is that if real minerals are used in the bulk like this, the track-laying should be first-class work in which derailments are practically unknown. In other less favourable circumstances, a dummy load should be substituted in which the material is not loose but fixed. In Fig. 77 (G) will be found a suggested scheme for making a wooden framework with a carved top which is coated with the necessary material for this purpose. This can be removed or inserted into the vehicle at will, though it leaves a problem as to how to dispose of it when the wagons are unloaded. All things considered, actual minerals loaded in the ordinary way are best, and with some degree of care and railway modelling pedantry it is



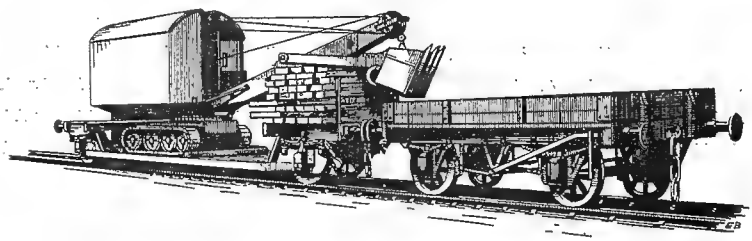
Transformer



Propeller



Sheeted Timber

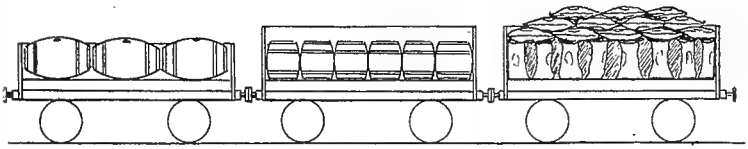


Steam Shovel

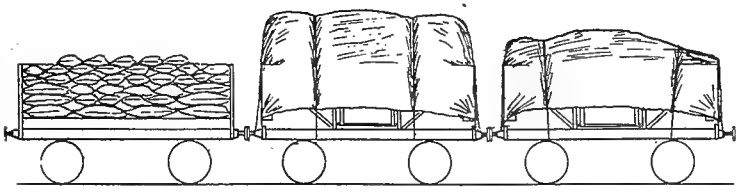
FIG. 76.—Typical and Correct Freight Loads

possible to load and unload such vehicles properly. And why not?

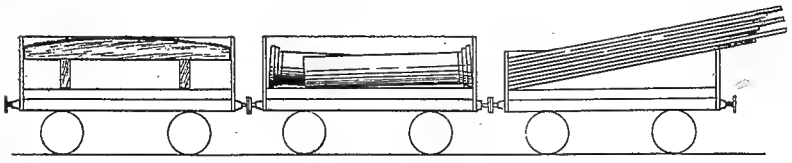
Timber loads may consist of planks of all sizes, heavy logs of "de-branched" trees, quartered beams, pit-props, railway sleepers, and sheeted timber as borne in open wagons. Planks are cut from all sizes of stripwood which can now fortunately be had in every possible form. A good scheme is that of building up loads of small planks with touches of glue so that they can be moved about with speed and convenience; the fact that they are built up in a block is no disadvantage when they are off-loaded for they would immediately be stacked by the track-side when delivered. The same applies to trees, if there are more than, say, three in a load. If they are of only medium size it is recommended to glue the loads into a fixed formation so that they always stand the same wherever they are. Long beams and trees provide interesting loading problems, for they might involve anything from one double-bolster or four-bolster vehicle to three or even four single bolster short wagons. In (J) we have an example of four such wagons used for this purpose, two being match-trucks, the other two bearing the load. Such loads are attached to the bolsters in a perfectly simple manner with chains. For O-Gauge, a good scheme is to fit short lengths of fine ships' chain with tiny elastic bands to join the ends, and these can be stretched over the loads with the elastic underneath. If small enough rings are secured this might even be possible for OO-Gauge, and may apply to all chained freights, more or less. The two photos of American flat cars loaded with timber show the approved method of stacking planks and pit-props on flat and in open wagons respectively. Beams are similar to trees in this respect. Wagons of sheeted timber make most effective features, especially when they occur three or four together. In (I) the method of placing the timber is shown; the projection over the end of the wagon should not exceed five feet. A sketch is also given suggesting how to place the tarpaulins. Such wagons are always arranged with the projecting timbers facing the direction opposite that of the movement of the train, and a vehicle with free clearance, loaded or empty, should be placed next to the last load. With tree-loads, the heavy ends of the trees are always loaded at the same end. It should also be stated that when four-wheeled bolster wagons are used they should be built with a piece of sheet lead attached underneath the floor. These wagons are light, since they have



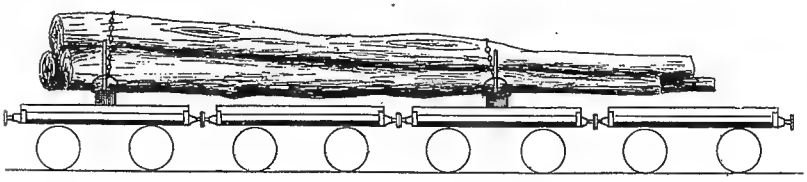
A. Hogsheads. B. Small casks. C. Large sacks.



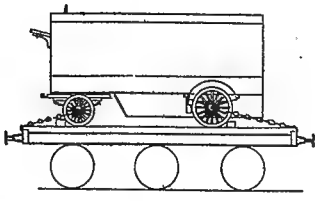
D. Small sacks. E. Hay and straw. F. Sheeted merchandise.



G. Bulk minerals. H. Large pipes. I. Timber.



J. Dummy and Match-Truck Rig.



K. Wheeled load on flat wagon.

FIG. 77.—Packing and Loading of Freight

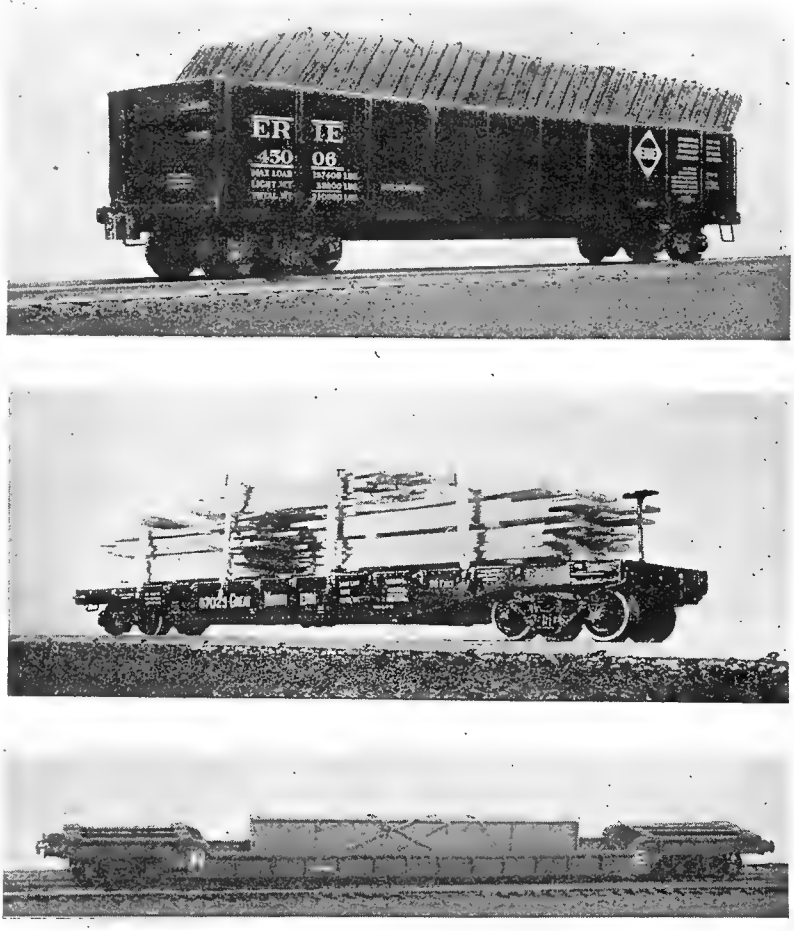
no sides or upper structure other than bolsters, even the bolsters being removed if not in use ; and they require adhesion to keep them on the best of track.

Miscellaneous merchandise is another item of interest, so great in its scope that it cannot be discussed exhaustively. In various books and articles I have given very many suggestions as to modelled examples, and in numerous instances these have been taken up by the commercial houses and made popular. Some firms produce these articles so beautifully that it would be waste of time to make them. Rolls of wire netting or barbed wire can be simulated with small rolls of " Windowlight " or gauze. Iron or wooden field gates are easily made up from wire or stripwood and are most effective. A friendly housewife will often take the trouble to stitch up small sacks stuffed with cotton wool—they must be very small for OO-Gauge ! These can be touched up with coloured ink to suggest lettering. Large conduit pipes can be made from rolls of bristol board with flanges consisting of strips of the same material wound around the ends. Smaller calibre tubes are cut from actual metal tubing, the lighter the better. Barrels and casks, pianoforte cases, packing cases, cotton bales, boxes of fruit, are all readily obtainable made up, and should be made of wood, not metal. Motor-cycles such as the Skybird and Hornby type suit OO-Gauge and O-Gauge respectively and are very striking. Mostly, they require repainting for realism. Such items of merchandise when loaded are usually, if not always, sheeted ; but they have also their place about goods yards.

Hay and straw also belong to the category of tarpaulined loads. The best way with these items is to make the load a permanent fixture, and in Fig. (E) will be found the method of roping down the sheets, tissue paper being used underneath them. Each load also has a diagonal binder passing from one buffer stock to the buffer at the other side of the opposite end. The best material for sheets of tarpaulin in the smallest scales is thin cellophane painted with art metal black paint, fitted the painted side outwards, lettered if so desired. Most attractive do these loads appear. Sacks have special rules for loading ; if small they are arranged as in (D) ; if large, as in (C). Large casks and small also are loaded differently and exactly as in (A) and (B).

Finally, we come to loads involving more or less special wagons, which would include ordnance, vehicles of all kinds, farm imple-

ments, mechanical appliances, locomotives, boats, anchors, castings, girders, transformers, and so forth. Cannon, tanks (military) and tractors are mainly loaded on flat-bogie or Rectank wagons; road vehicles, light tractors, usually take carriage




Representative Loads, American and British

wagons of the open type, as also do small agricultural implements such as binders and reapers. Steam shovels, cranes, and so forth use well wagons of either the imp or the well-bogie type according to size. Wells are also used for anchors, propellers, heavy castings, boilers, ships' boats. Most companies have special wagons for certain of these loads, such as transformer

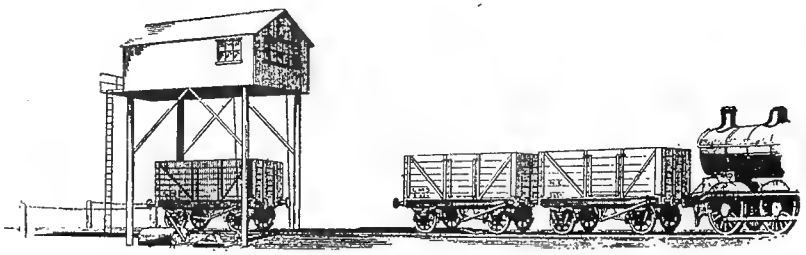
wagons, locomotive wagons, marine boiler wagons. The enthusiast is advised to secure from each railway company, where possible, a copy of its own handbook describing the handling of these special freights. Before the war these were readily obtainable. There are also special wagons for bricks in the bulk, and loads of these can be modelled by using a dummy insert covered with a suitable—but not unsuitable—brick paper.

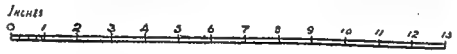
The majority of wheeled loads are attached in the same manner, as indicated in the diagram (K). That is to say, the wheels are chocked with a fixed-down block at each other end and the vehicle is then chained by the rim of the wheels. Even with an item like a steam shovel this is the principal method of attachment. On an imp wagon the actual shovel might project beyond the end of the wagon and the jib would then be supported by a timbered bolster, a match wagon being also involved. On a well-wagon, the shovel would rest on the higher end of the vehicle without any other support. Transformers are carried by the suspension method and usually require no attachment other than by movable beams forming part of the carrier. Girders for bridges are borne much the same as trees. In actual procedure, the chains which attach such freights are fitted with screw adjusting clamps much upon the principle of the screw-coupler.

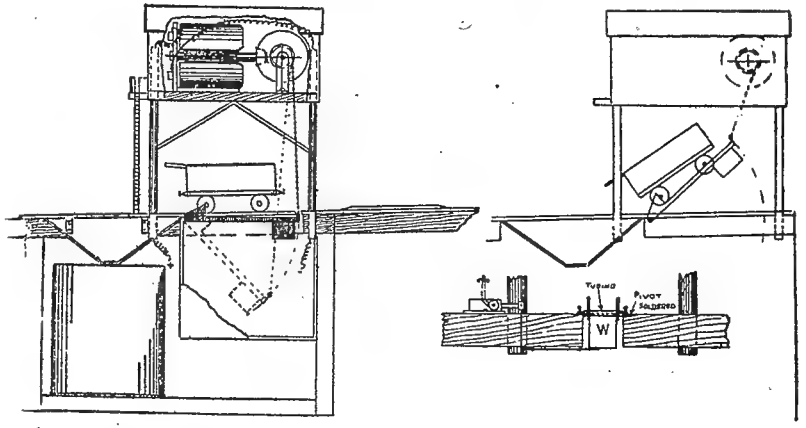
The placing of loaded wagons of certain types in position on trains is also a matter for care and correctness. It is usual to place empty wagons of any considerable length at the rear of trains to avoid undue strain on their long bodies when unloaded, though modern steel vehicles are not so susceptible. It is a permanent rule where possible to keep the loads ahead and the empties at the rear. Vans are never run on trains in this country with their doors open, and rarely in any country. Vehicles carrying inflammables are placed away from the locomotive. In shunting, these wagons are never allowed to move under their own velocity unless every track has been fully cleared for them.

## TIPPING END-DOOR WAGONS

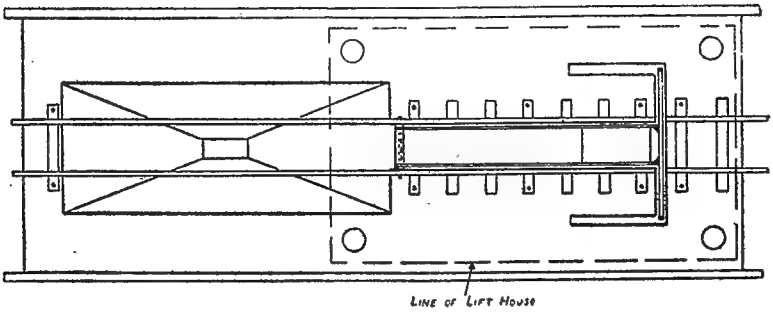
The thing that requires to be emphasised about this end-door wagon tippler is that it *operates*. That is, it gives 100 per cent. efficiency. Provided that it is made right and that you have six volts of current, it invariably does its job. In *The Craft of*

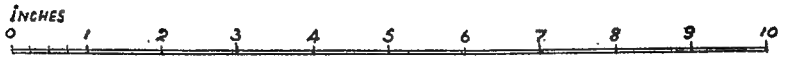





*Details of the operating-gear.*




*Plan of wagon-tip.*

FIG. 78.—Wagon Tippler for End-Door Vehicles

*Modelling Railways* I have given a design for a lift exactly identical with this one externally, but intended only for manual-crank operation, that design, in fact, being an exact reproduction of an actual lift in railway service but for the handle-crank. In this design I have stuck precisely to the external details of the earlier one, but with the following added advantages : it operates electrically with a sixpenny Woolworth motor (bought long before the war) ; it is powered, if desired, by three pocket batteries ; it is controlled by a small electric switch at the track-side on the lift-base, and by a common OO-Gauge point-lever which operates the drop-bolt.

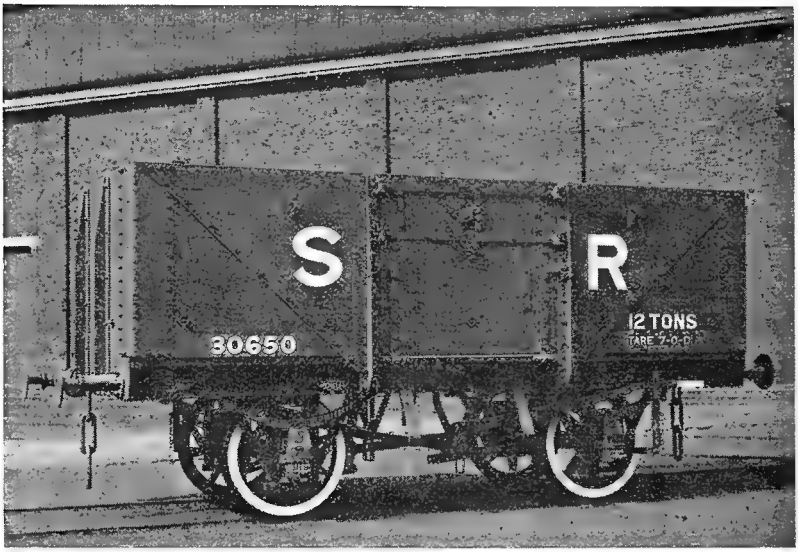
The scheme is given in the perspective sketch, in which the train of wagons is shown being pushed over an uncoupling ramp on a slight gradient. The movement is as follows : the wagon automatically uncouples, runs down under the lift and stops ; the switch is thrown in, the hoist is raised, the contents tipped through the already opened door ; the catch-bolt is thrown back, the switch thrown out, and the lift descends by its counter-weight down below the baseboard, while the wagon returns to the track and runs itself off to a siding. The switch is then thrown in, the lift rises, the bolt is set, the switch thrown out, and the apparatus is ready for the next vehicle. The tippler is fitted with a " concrete " hopper into which the coal is discharged and caught in a metal receptacle (in this instance a mustard tin).

The only part of the structure requiring somewhat meticulous care is the wooden base for the tracks and hopper. I have given a dimensioned plan of this block of wood ; the apertures can be easily cut out with a common drill and fretsaw. If soft satin-walnut is used the work can be done with a pocket knife, for the base need be no more than ¼ inch thick. The apertures required are for the track-hopper, the space between the tracks under the lift, and the slots for the lift-beam and the cables. Four holes are also required through which the tubular columns are inserted—a tight fit. For these columns I used some old ¼-inch brass tubing I happened to have on hand.

The idea behind the tubular columns is that the electric wires for operating the motor can be conveniently run up two of them. But if metal posts in the solid were used, these themselves could be used as power-leads and the battery and motor wires soldered to them.

Begin, then, by cutting out the base. Carefully trim it with

sandpaper, and then attach to it along each upper side edge a length of bird-cage strip, inserting small screws at every fourth or fifth hole, and leaving a slight projection at the four corners. This will strengthen the base and provide rests to retain the hoist when it is slipped into the baseboard of the layout. Next make the metal frame for the lift-house. Around the base of each metal column wrap adhesive strip tightly to form a plinth, which will prevent the columns from slipping too far below the base. Next shape and solder a length of OO-Gauge rail round the outside of the four columns, in rectangular form, to




An Excellent Example of a Standard Open Wagon in Actual Practice

form the seat of the lift-house, at the right height. Then solder in the diagonals, for which I used 1/16-inch square brass rodding. This is soldered to the rail and to the insides of the columns. This leaves you with the four upper parts of the columns projecting high enough to enter the shed. The work on the shed begins with the floor, which is cut to size, drilled for the columns, and then fitted with the mechanism. The motor I used was bought at Woolworth's and is of the 5-pole, field-wound, non-reversing type. A reversing motor is not required. Any of the small cheap examples will serve. The gearing is all Meccano, and consists of spindle, a pair of pulleys with collars, a set of bevel gear with a large gearwheel, and suitable washers. The

bearing I made from a length of Meccano drilled strip, which in my own model is attached *underneath* the shed (floor being notched at the sides to take it), and is not therefore exactly as shown in the drawing. This is the most convenient method I know. I had to do a little manipulation to solder the spur wheel on to the motor-shaft, but it was not difficult. If the motor spindle is small for the spur-bore a brass tube sleeve can be fitted. It is imperative that the pulleys come exactly in line with the chain slots in the lower base of the appliance, of course. Twenty-link ship's chain is used for the hoist, and the ends of the chains are attached with solder to the pulleys ; it is necessary to avoid too much lapping of the chains which will result in an uneven list on the part of one or the other chain. The chains are therefore soldered exactly at the point where their length is such as to allow the cradle to sink to its extremity. The wide walls of the lift-house should be properly fitted with celluloid windows of the sashed type, attached inside with adhesive strip, and the walls should be painted one coat, at least around the edges of the window apertures, before the glazing is done. A door is placed on the gallery side. In soldering the chains, use a liberal length of chain and snip off the balance when soldered ; this is far handier than struggling with the exact lengths.

The cradle itself is a natty job to execute, though quite straightforward. It is shaped as shown, and consists of an identical pair of sides, cut from tinplate, with a soldered pivot at one end and a lead counterweight at the other. I have given in the drawings the exact dimensions of the counterweight I required to lift a OO-Gauge wagon with a slight fling when loaded with powdered coal. The counterweight is responsible for all the reverse movements of the mechanism, and comes into play when the current is switched out. It must be heavy enough to draw down the cradle to the limit against the dead gearing of the appliance, and light enough not to impede the 6-volt energy which lifts it and the loaded wagon. Begin with a good-sized weight, and keep experimenting by cutting off a little until it is just right.

The pivot of the cradle is slotted through the pair of sides and through a piece of Mercontrol brass tubing and two tiny washers of the same material for the outer sides, the pivot itself being soldered underneath the running rails which take the wagon. The movement of the pivot should be quite free and without any binding, and requires an occasional touch of light oil.

It will be seen that the cradle is designed to engage, when so set, the leading axle of the wagon and to stop it. Then, when one end is raised, the twin sides touch the undersides of the axles and raise the wagon. When the cradle is dropped right down, the front axle of the returned wagon is freed. In the elevation, the shaded position is that necessary for receiving the wagon when it runs on the lift. The track under the shed and over the hopper is special, and made from the smallest brass angle obtainable, which is just the same size as OO-Gauge rail, and the angle of the strip is filled with solder and filed neat. This provides a rail which will not retain the dumped material on its top edge, and will thus allow the wagons to roll over it when discharged. The hopper is shaped from tinplate, soldered at the corners. Try a cardboard shape first until you get it right; then make it of tinplate. It can be attached to the underside of the base by soldered and screwed tinplate tabs, neatly made. I used cage-strip to form these tabs.

The lift-beam, across the ends of the cradle, engaging the chains, is rather important. I made this of the same brass angle, and soldered two pin-eyes to the ends for the chains; these require to be well soldered and stout, to take the shock of the lifting process. The gap in the base must not be too wide to allow the wagons to ride over it, nor too narrow to impede the movement of the beam.

The right scheme is to get the appliance working perfectly with a loaded wagon (use an old one) before the switch and its connections are finally started on. Do not use batteries for this purpose (of the pocket type) unless you have plenty, for I have omitted to say that they become exhausted with marvellous speed—especially the ghastly batteries that now pass under that name. Two dozen movements and they begin to get tired. The best scheme is to discard pocket batteries—I use them simply to exhibit the mechanism in a portable manner—and to use the railway current.

For a switch I was lucky in having an old barrel reversing switch from a Bing OO-Gauge electric loco. It is just the thing and has a strange correct look with it, appearing very much like an electric winch. See the perspective sketch. The apparatus for locking the cradle position is very simple—a Hambling point lever of the set-screw type, with a fine wire bolt, as shown in the small drawing. Throw over the lever and the bolt is pushed forward below the base so as to engage the underside

of the counterweight. Throw it back and the aperture of the cradle is clear.

Note that the approach track, and the track of the lift, are both on an incline. This is part of the automatic movement of the appliance. The only feature requiring hand manipulation is the lifting of the end-door snag when the wagon is in place. The mouth of the hopper must come well under the wagon end to take the slight discharge when the door flies open. Ladder and gallery handrails complete the outfit, which may be painted black, grey or red oxide. Paint the hopper to represent concrete.

## A ROTARY WAGON-TIPPLE

Long years ago I modelled for OO-Gauge a working rotary wagon-tippler and found it to be a thoroughly practicable item.

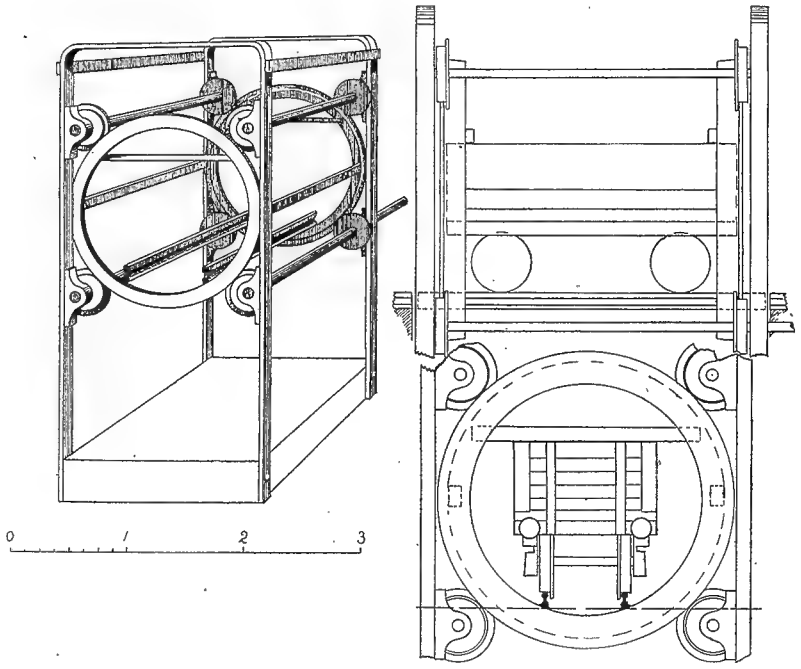
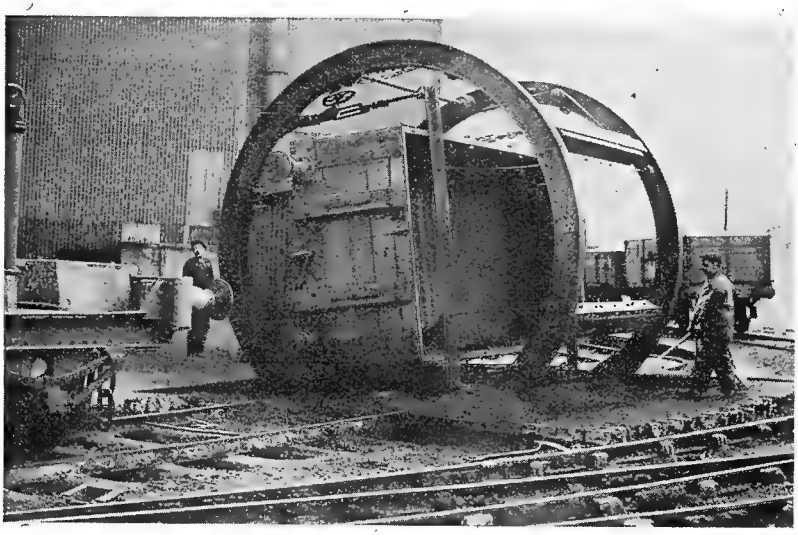



FIG. 79.—Rotary Wagon Tippler (OO-Gauge)

In those days it was possible to obtain from Leeds a very large white-metal O-Gauge locomotive wheel which is long ago off the market. This was exactly the correct size for the rotors,

after the spokes had been filed out—a very speedy and simple task. For the design herewith I have discovered a small 1-Gauge wheel which quite suits the purpose, and may be had from Bonds or Bassett-Lowke's. The softer the metal the easier the filing out of the spokes will be. There should be nothing left remaining but the rim. The perspective sketch (Fig. 79) will show, along with the diagrams, how these two rims are soldered to form a frame, the two running rails also aiding the work, the result being an integral unit. This fits snugly, but not too tightly, into the treads of eight discarded OO-Gauge wagon



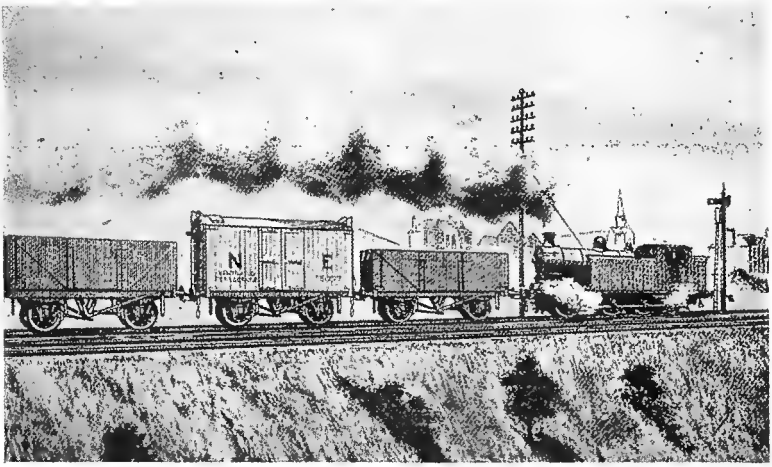
An Example of the Rotary Tippler in use

wheels, which are fixed on axles as shown. The main frame can very well be formed of brass O-Gauge running rail if desired. The bearings for the axles are improvised from O-Gauge brass point-rod guides, brass being necessary on account of wear. One of the axles may project to form a turning-crank for the hand, if manual power is to be employed. This crank should be placed at the base, not the top. The rotor will operate perfectly under all conditions.

One important feature is that the retaining-bars, which hold the vehicle in place while it is tipped, must be fixed, and this demands that the wagons used are all of standard height. Any height can be decided upon, but they must be all alike, and must be devoid of any end-door projecting hinges across the

top edges of the ends. LaNal ramps will serve to uncouple the wagons before they are run on to the rotor. The appliance should be fixed to be served by wagons from a high-level road, their contents being tipped into a small container-box below, or through a suitable hopper into lower wagons. The wheels will require regular lubrication. A photo is included which shows an example of such an apparatus in real practice.

Should the rotary tipple be operated from one pair of wheels at the base, there will be no difficulty in the movement. But if it is necessary to operate from the top, some form of gearing must be carried to the lower wheels. In the West Midland model, this was done by introducing Hornby miniature chain and spur gearing, as used on their miniature tanks for the caterpillars. The chain was obtained in lengths.




## MODELLING ALL-METAL HOPPER WAGONS

HOPPER wagons are vehicles provided with arrangements for the discharge of their contents from opening gates beneath the body, so that coal, gravel, or other contents may be dropped directly on the tracks, or by the track-side, or into receiving pits, in bulk. For small-scale work the hopper feature is carried out in dummy form, though for the larger scales there is no reason why some simplified idea for operation should not be applied. If in the miniature standards it is really desired to empty wagons mechanically, then the best scheme is that of a rotary wagon tippler, working in conjunction with ordinary open-top vehicles.

The procedure for building hopper wagons in metal is in many respects akin to that of making vans as will later be described. The formation of the bodies in two pieces, one for each side and end, the soldering and spacing the side struts and general arrangement are the same. But a few preliminary remarks as to the design of the vehicle may be necessary.

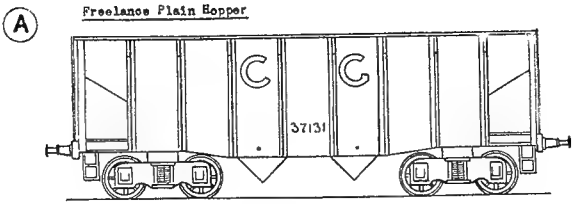
For freelance work, where no special railway company's stock is being modelled, there is a very wide choice of designs for hoppers, and many extremely interesting styles can be adopted.

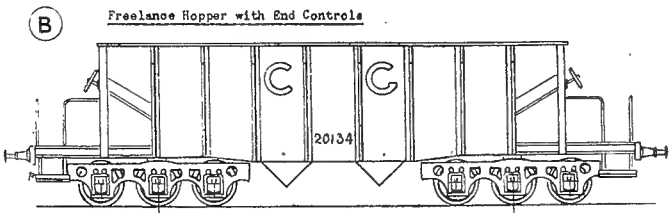
A good plan is to decide upon one of these and to make a number of the vehicles on the mass-production principle, whereby all the body-pieces, all the side struts, top edge-beadings, ladders, hopper blocks, etc., are cut at one time. This gives uniformity in finished appearance—so desirable when a train of these wagons appears as one unit. I have modelled several dozen hoppers in various styles, and I would like to give the results of my experience for the benefit of beginners. The tendency in this country is to follow approximately much that is American with regard to these vehicles. For example, the N.E. ballast hopper (4-wheeled) bears a fairly close resemblance in its general principles to earlier American types, the provision of the control platform being a departure, and a very striking one. There is an N.E. bogie steel hopper which is very American in its appearance, down to the design of the hoppers themselves, which are of the cross-track type. A design for this should be secured if it is desired to model it ; and a small drawing appears in *The Craft of Modelling Railways.*

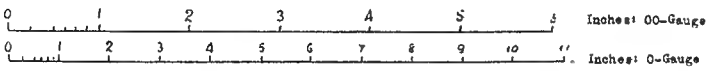
The G.W.R. have some 20-ton 4-wheel steel hoppers for coal, as well as others for ballast traffic ; the L.M.S. have 25-ton ballast types, and so have the L.N.E.R. On the S.R. there are some 4-ton ballast hoppers for the engineering department. Most of these are new vehicles, though a number also date back to pre-grouping days.

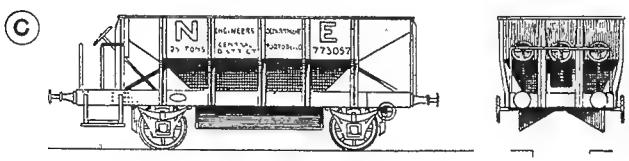
In American modelling spheres there is such a lavish provision for all scales in the matter of components and designs, that to begin to model freelance hoppers without some reference to these accessories would seem a pity, even though at the moment it may be difficult to secure them. For OO-Gauge especially, these fittings are well worthy of consideration, particularly as regards the parts for bogies. But on the other hand, the information I want to give will not devolve in any serious manner upon the possibility of obtaining these adjuncts.

In the diagrams herewith, we begin with a design (A) for a freelance hopper based largely on American practice, the structure being of the simplest and baldest kind, British type buffers and Merco wagon bogies of the Runeezi type being included. The design of (B) is much more amplified and bears marks of British style as well. The operating platform used on a N.E. type of 4-wheel vehicle is here applied to both ends of the larger wagon. The body structure is much the same as in (A), and the bogies used are Varney Commonwealth 6-wheel

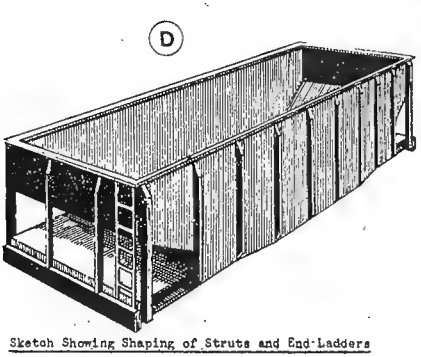


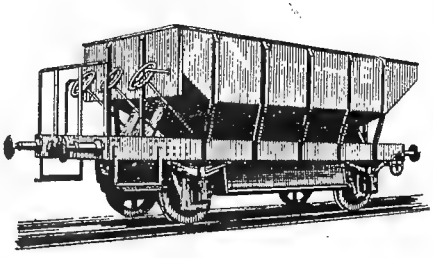



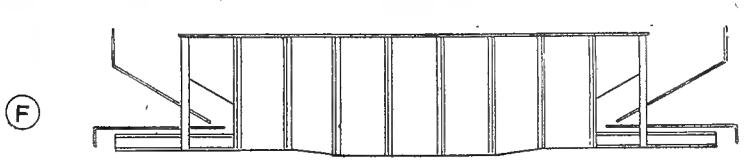




N.E. Hopper Ballast Wagon




Sketch Showing Shaping of Struts and End-Ladders




Building Up the Body

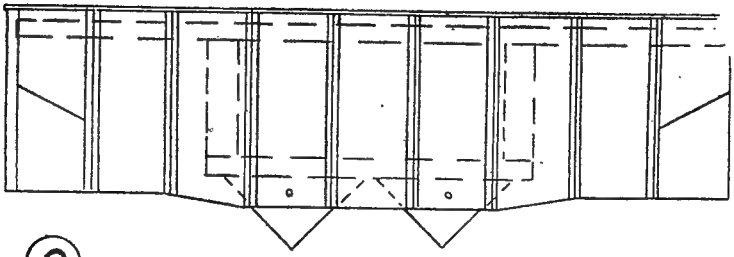
FIG. 80.—Modelling All-metal Hopper Wagons

trucks with British wheels. I know of few more striking wagon designs than this, and I have made a few, precisely to this pattern.

In both (A) and (B), the sides are of tinplate, with brass struts, to be described later, the floor framework being in ⅛-inch channel brass formerly obtainable at Bonds, Limited. Four short lengths of this section brass are necessary for each vehicle and they must be soldered to the sides in a dead line with the aid of a stripwood straight edge. The corner posts of the vehicles are of 1/16-inch square brass strip. The diagram (F) reveals the method of inserting the sloping hopper ends which also form in one piece the body ends. Tinplate floor pieces, with a bend-over to receive the soldered brass buffer-beam, are also shown. All the soldering should be strongly carried out on the underside of the wagon. The top edge strip along the wagon sides and ends is also of smallest brass angle, the ends of the lengths being filed to form a neat fit. Sides, struts, and top rails are made up first, two pieces (each forming an end and side) for each vehicle. The brass beams are then fitted with buffers and soldered in place. The beams can be had ready drilled. Steps of the most convenient type for clearing the bogie-swing should then be added, with the end ladders of Merco signal ladder.

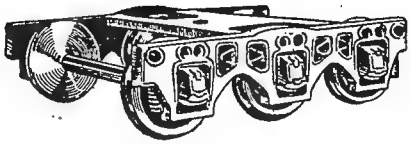
A design of an actual British type of wagon, with a perspective sketch, will be found in (C) and (E). A scale blueprint can be had from Edwards Bros., of Cardiff. In this instance the hopper portion should be soldered up first and attached to the shaped sides and ends. A wooden block can be effectively used instead, but it must be neatly made. Hobbies stripwood angles may in fact be called into service to avoid a lot of unnecessary shaping. In all instances, hopper control wheels are a Hambling product.

The formation of the dummy hoppers below the other wagon types is a feature on which I spent a lot of time and experiment, and finally the method given in (G) was adopted as universal practice. It is simple in the extreme, and it serves not only to give the hopper boxes but to provide a framework for the dummy top of the wagon which is later covered with finely sifted coal. A Woolworth's sixpenny garden sieve is ideal for this purpose when the coal has been crushed with a hammer inside a folded cloth. The pins through the wagon sides retain the wooden framework permanently in place. The angle-pieces



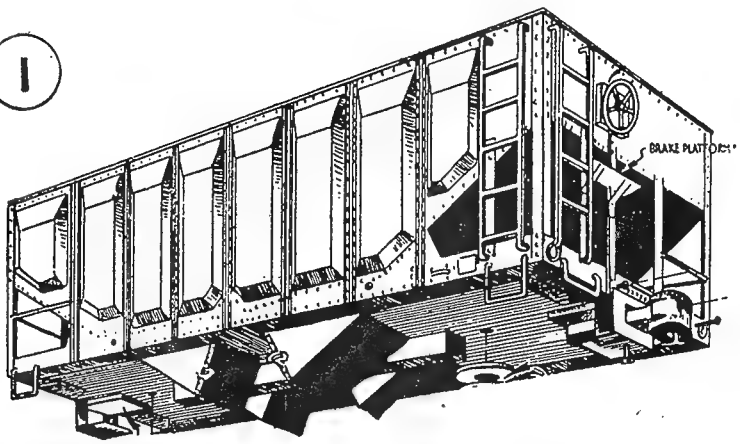
G

Internal Woodwork and Hoppers



H

Varney Commonwealth Truck



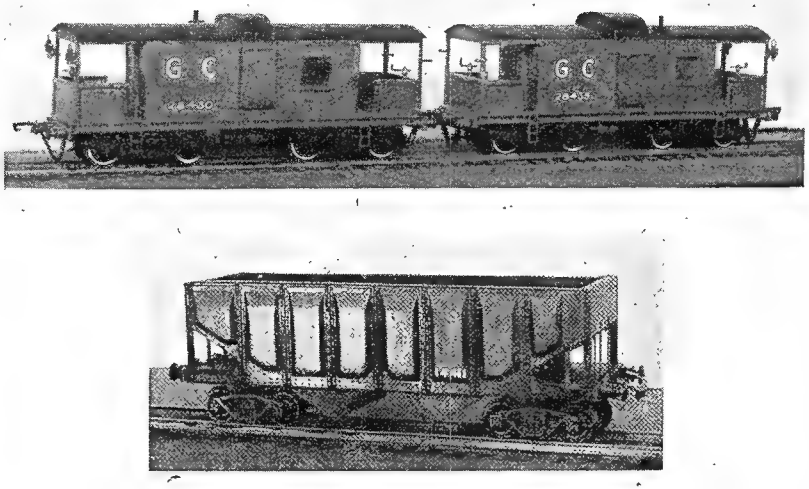

I

Varney Shim Brass Offset Hopper

FIG. 81.—Details for American Type Hoppers

are Hobbies stripwood angle of the smallest available size. The solebars of the N.E. wagon would be made in Leeds tinplate strip or from brass channel with the channel side inwards. Note the filing off of the tops of the side struts to an angular shape ; this is done by rubbing the side along a fine, large file, giving a sideways movement. A sketch of the Varney Commonwealth truck is given in (H). It is made in brass, with plenty of detail.

One other Varney item is illustrated ; see (I). This is the shim brass offset hopper wagon side sent out practically ready




All-Metal Vehicles built by the Author

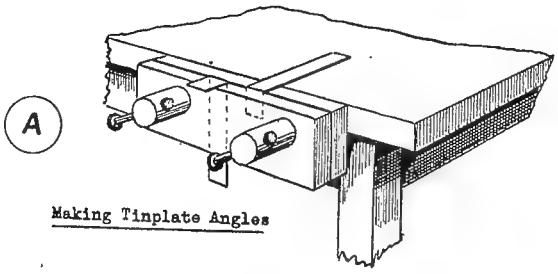
for assembly. The shim brass is extremely thin sheet brass from which the beautifully shaped sides are pressed. This material can be soldered without any trouble on bare tinplate sides.

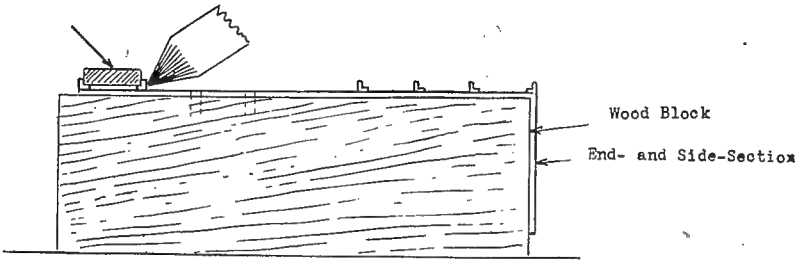
The painting of wagon wheels—especially the whitening of the rims—is a ticklish task, when the wheels themselves are very small. It is not really desirable to paint the treads of the wheels, though even oxidised wheels seem to require painting black or dark brown. On nickel-silver wheels the treads look very real and handsome if they are left as they are. The scheme (Fig. 87) shown in the diagram offers a method of forming a permanent wooden jig—the diagram needs no explanation—in which several wheels may be placed (on their axles) at one time, and,

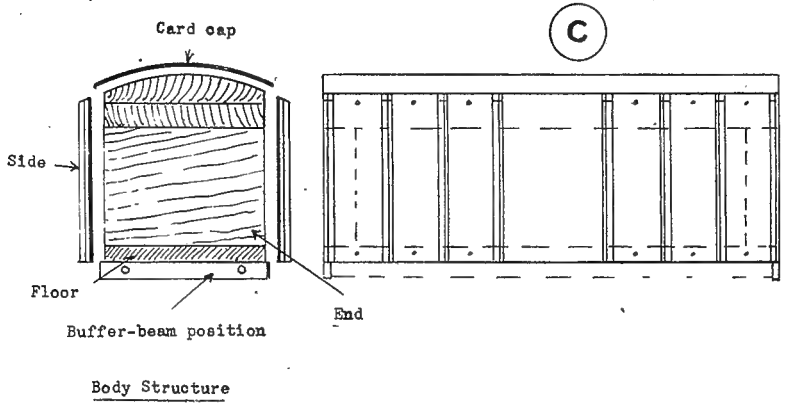
while turned with the finger, may be painted easily as required. A second operation, after the black is dry, serves for putting on the white rim. The holders consist of pieces of bird-cage drilled strip. Along one side of the jig these are fixed with two small screws ; along the other side only one screw is used for each, so that they can be swung over to release the wheel. A small pin is inserted to hold against the swinging holder. The space for the moving holders is provided by inserting small washers on the screws which hold the cross-bar, which is also of cage-strip.

## BUILDING ALL-METAL VANS

Lithographed rolling stock is an excellent provision for the beginner ; but the majority of experienced workers will soon desire to run vehicles more detailed and realistic, requiring something further in the matter of constructive skill. I know of no better method of building superfine examples of rolling stock for freight traffic than that of using the all-metal system. It will be found to produce a much less clumsy finished appearance than woodworking, and, for covered vehicles, it enables the excellent American stamped shim-brass wagon ends to be brought into use. The necessary materials are readily obtained in this country, consisting of brass angle-strip and cut tinplate strip, the latter to be had in normal times of supply to any required size. Especially for OO- and HO-Gauge work these tinplate strips are perfection in cheapness and neatness of cutting. In the diagrams, (A) shows the method of forming a sharp bent angle on tinplate strip of, let us say, 1¼ inches wide. A wood-vise is used, the pieces being inserted after a grip has been taken on the scribed line about which the bend is required. The tinplate is pushed over and then lightly hammered down to make the bend sharp and neat. The prevailing width for a van side in OO-Gauge is 1⅛ inches. Assuming that the piece has been cut and bent to form one end and one side only, we have what is seen in (B). Here the piece rests on a wooden block ready for soldering on the necessary side struts in angle brass. The latter should be of the smallest size obtainable. The side is scribed to give the positions of the struts, formed from the smallest commercial angle-brass, leaving a wider space for the door, whether this is to be of cardboard or one of the pressed brass American doors. In the drawings we include the



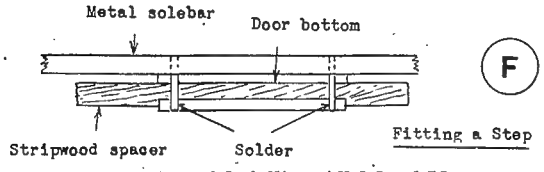
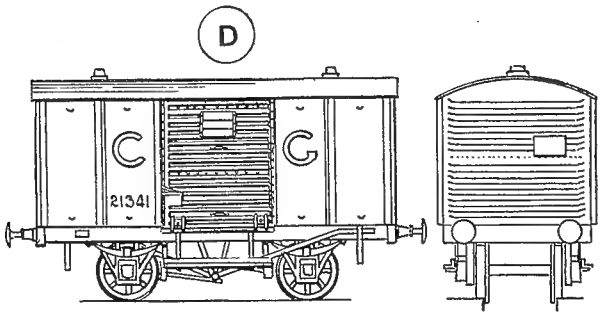



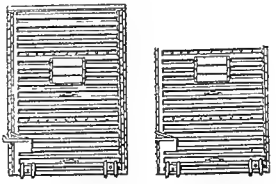

FIG. 82.—Modelling All-Metal Vans

latter. These pressed ends and sides have the corrugations standing out admirably. In soldering on the struts, begin with the two outer end ones, and then fix the remainder by using a piece of ½-inch stripwood as a gauge, seeing that each strut is accurately placed. The ends of the struts may be left projecting and cut off later. The metal door will require to be slightly shortened with the scissors (see drawing) since American cars are higher in the body than British. Two of these body sections are of course needed for each van. The metal doors are fixed by very lightly soldering and sweating the upper and lower edges, surplus solder being then sandpapered off. The surplus is also filed off neatly from the side struts and the sides and ends made glossy and clean with sandpaper.

The woodwork employed in the structure is shown in (C) and (G), and comprises a shaped roof, an under-piece for this roof, a floor and two end blocks. Hobbies, Limited, supply ready-cut arc-shaped strips 1½ inches wide which serve admirably to form roofs ; this material can be kept in stock and may be used for many purposes, being trimmed for width with a pocket knife as required. The important and difficult matter is the curve of the roof. The under-piece is there in order to provide a body into which the side pins through the tinplate sections may be driven. Drawings are not to scale, and would be varied by the type of wagon modelled. For a four-wheel type, the chassis solebars dispense with any other under-work. Build up the body as in (C), attaching the sides-and-ends pieces with fine short pins to the woodwork, and then join the two broken corners on the tinplate walls with solder and clean them off. Corrugated shim-brass ends may now be fitted, after shaping them for the roof as in the drawing of the Varney end in (C). Finally, fit the cardboard top cap for the roof. This card strip can be had in cut lengths from Merco. The metal ends are soldered as described for the doors. The pins in the sides are best driven by using the vice and holding the body so that the pins do not bend. Finally they are driven down with the blunt end of a file. The tops of the brass struts are filed off to take the shape of the roof cap which should snugly cover them.

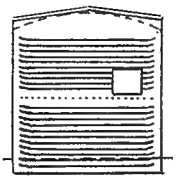
Bogie vans are just as straightforward. The scale G.W.R. " Mink " shown in (H) will give a contrast to the freelance van already dealt with. Here, the doors and ends take the approved form and may be worked (the doors) in strips of postal card. This special vehicle needs channel underframes, consisting in



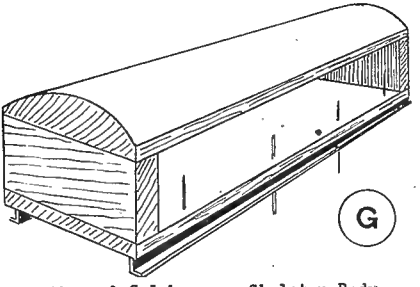



U.S. Size Shortened

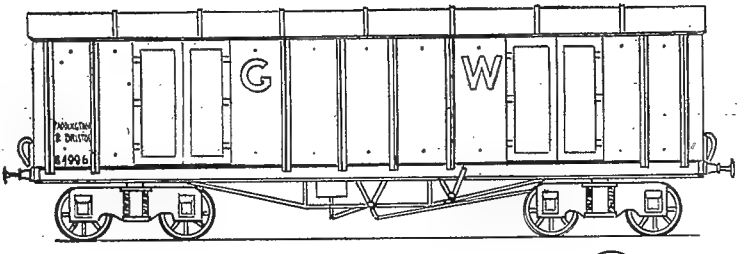
Varney Door J



Varney Car End




Channel Solebars on Skeleton Body




Finished G. W. R. Mink Van H

FIG. 83.—All-Metal Van Details and Designs

the model of $\frac{1}{8}$-inch channel brass. This is attached by soldering it to pins projecting from the floor, the inner pair of which form the hangers for the truss rods. For the G.W.R. "Mink," the nearest approach to a OO-Gauge bogie is the "Merco" goods type.

The adding of a step is shown in (F), this being a rear view of the work, for which brass angle is again used, attached to

A OO-Gauge Metal Van built as described

pins driven into the floor. You now have the vehicle as shown in the scale drawing (D), all ready for the paint-shop.

## MASSED-PRODUCED WAGON AND VAN SIDES

Among the many methods of producing the bodies of hand-built wagons, without doubt the mass-producing method is the speediest, simplest and most conducive to uniformity in appearance of the finished vehicles. By this method, the complete set of sides for six to a dozen vehicles are produced in one series of operations, the builder working on a single sheet of thin plywood pinned down to a drawing-board. There is something fascinating about setting out to build a series of the same type of wagon, and about getting them all exactly alike in size and finish. By this method, the lining, the strapping, the height and width of the vehicles are guaranteed to be exactly true in each instance,

and the wagons have the appearance of having come out of a proper railway works.

The simplest task to start upon would be that of a batch of, let us say, high-sided private owners' coal wagons, with either drop ends or fixed ends, but all of the same design. The material would consist of a sheet of plywood 1-mm. in thickness, and a consultation of Fig. 84 will give an idea of the appearance of a batch of five such sets of sides before the sheet is finally cut

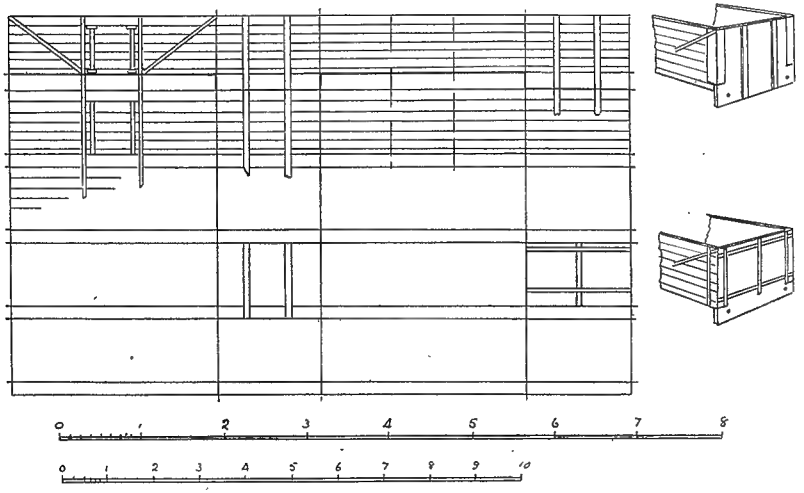


FIG. 84.—Mass-producing Wooden Open Wagons

up for assembling. Briefly, the following is the tabulated order of procedure :—

Pin down the plywood squarely on the board.
Mark out the position of each scribed plank-line.
Scribe the plank-lines.
Cut the strips of adhesive tape for strapping and hinge bars.
Mark the position of these.
Fix the strips (vertical) in place from top to bottom of sheet.
Mark the position of side and end cuts.
Fix diagonal strapping.
Fix door hinges.
Cut with razor perpendicular lines for side-separation.
Cut lines (horizontal) for side-separation.

A few points need to be noted. First, there is the difference between the two types of wagon ends and their strapping. There is also the varied spacing of the planks. Note also the wide spacing for the solebars, and the allowance made for the buffer-

beams, which can be trimmed later if too great. Care will also require to be taken especially in scribing the planks, so that all lines are regular and well-matched for each wagon.

The scheme for a series of similar vans is given in Fig. 85. The only radical difference lies in the shaping of the curved roof at the ends, while there is also, of course, the special requirements of the particular van side being modelled. But the methods are the same. Brake vans also come under a similar category ; and a series of four of these, all precisely the same in structure, will be very attractive.

The making-up of the wagon sides follows the usual procedure,

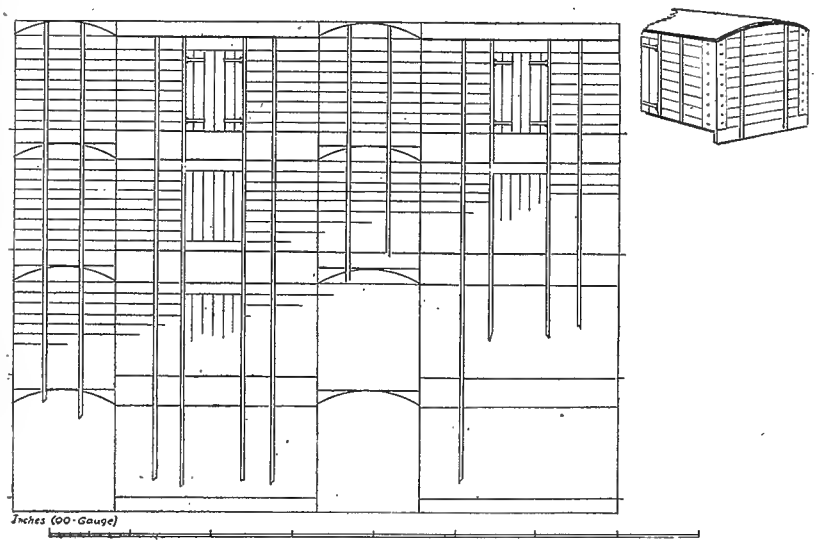



FIG. 85.—Mass-producing Wooden Vans

and the sketches of the two types of end will make this method clear. The sides are attached to the thicker standard plywood floors with beheaded pins and glue, the pins being pressed right down. End-door wagons will be specially dealt with later ; but for four fixed sides, when the walls are all in place, the corners are joined with a touch of glue and corner plates either made from adhesive tape or purchased commercially. Slater, of Timperley, has a good series for OO-Gauge, which is the scale we are now describing. The diagonal strapping can either be left till the last job, after the corner plates are on, or, if fixed earlier, the tips may be left unstuck and later tacked down with

glue over the corner plates. Corner-plates can also be had for vans, as well as corrugated metal ends to stick over the plywood, if these are peculiar to the modelled series.

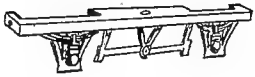
For O-Gauge, a heavier plywood sheeting would of course be needed, and the strapping would consist of very thin card strip in proper lengths. This thicker plywood could be pinned down to the table for scribing by using beheaded dolly pins. Corner plates of card, with actual rivets formed from small pins, would be used. Rivets would also be placed along all the strapping for a correct job.

The best method I know for the assembling of built-up vans is identical with that described in connection with the all-metal vehicles. The sides, roof-block and floor are attached with glue and beheaded pins, being packed square with suitable lengths of loose stripwood and ringed around with elastic bands until set. The ends are then set on their blocks and duly inserted with glue.

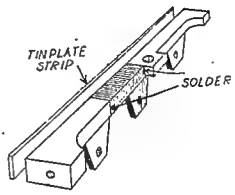
## ADAPTING STANDARD UNDERFRAMES

The standard wagon side-frame hitherto on the market for OO-Gauge provides a wheelbase of 38 mm. It is illustrated in the sketch in Fig. 86. The majority of ordinary vehicles can quite well be fitted with this underframe, though there are some types, such as timber bolsters, brake vans and certain vans of the all-metal kind or built for special capacities which will need wheelbases differing from this standard, or which will require shorter bodies or longer, as the case may be. It is therefore necessary to adapt the sideframes to suit these requirements. Sometimes this may be done without sacrificing the cast-on brake gear ; occasionally the gear will have to be removed and substituted by hand-built gear to suit the shorter frame.

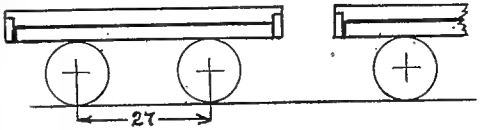
In the next diagram there is shown the best method of cutting the sideframe and inserting an odd axleguard to form a six-wheel chassis. The best scheme is to screw up the pieces on the underside of the floor and to make the joints in the white metal with a touch of solder, afterwards sweating on a strip of $\frac{1}{8}$-inch tinplate obtainable in normal times from the Leeds Model Co. The strip will effectively cover up the joints in the frame, and will solidify the structure. In this instance, brake gear is dispensed with, though there is nothing to prevent the addition of brake-shoes.

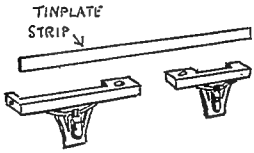


Standard OO-Gauge Underframe

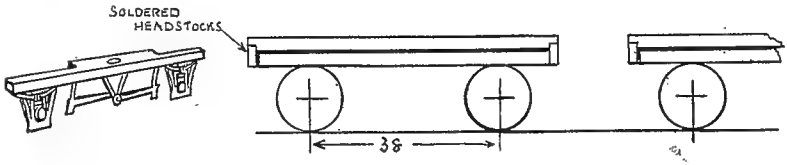



Inserting Third Guard

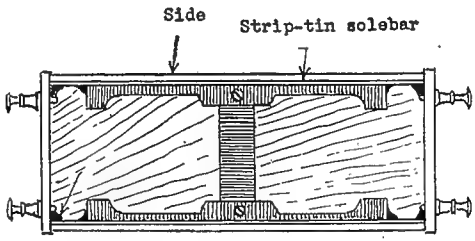



Shortening Actual Wheelbase




Shortening Underframe with Wheelbase Unaltered




Extending Runeezi Chassis

FIG. 86.—Standard Wagon Underframes adapted to Special Needs

Next we have the instance of a shortened wheelbase, effected by simply cutting out a section of the frame centre. The remaining guards are drilled for screws and attached in the usual manner, the strip being again called into service. Again, in the diagram and sketch following this, we have the shortening of a body without altering the wheelbase or the brake gear on the sides. Small sections of the ends of the sides are snipped off, and the standard metal headstocks are soldered to the side-frame ends after the latter are screwed to the floor, the buffers being soldered into the headstocks.

Finally, we have the example of an extended body to suit

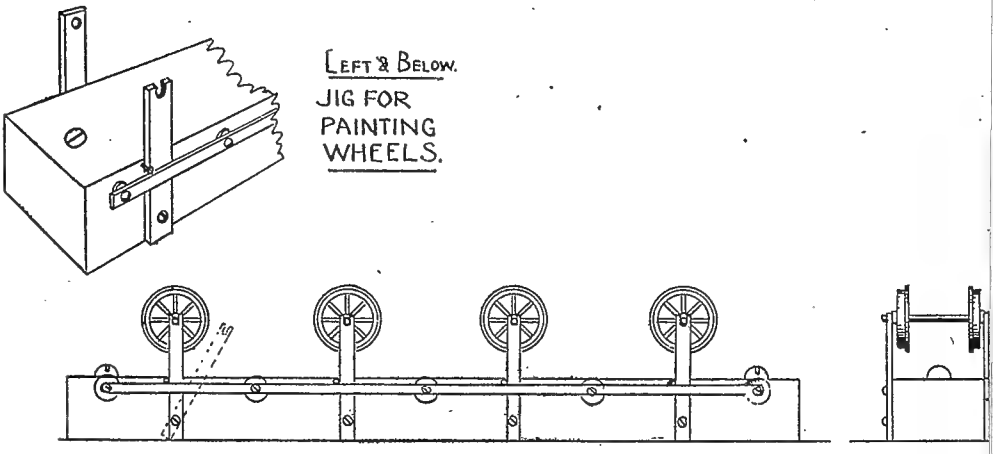



FIG. 87.—Jig for painting Wheels

a large-capacity box wagon. The drawing shows the inverted floor and the sides attached. Here, the tinplate strip gives the additional length and is soldered to the headstocks as before. This method of procedure is well suited to the construction of all-metal vehicles as already described ; in most of these types, the body length will be found to exceed the standard side-frame length.

## SMALL-SCALE END-DOOR WAGONS

Standard scale wagons with " Runeezi " chassis are commonly fitted with a somewhat heavy floor, which consists of a block of 3/16-inch plywood. The interior of the wagons are therefore

normally somewhat shallower than they appear externally to be. This means that the end doors only require to operate as far as the top edge of the floor, though for the ultra-fastidious the doors can very well be made to come down as far as the upper edge of the headstocks. In my own models I made a wooden fillet, shaped at the ends, to serve as a facing for the headstocks and a covering for the floor edge, as the centre diagram (Fig. 89) will show. The work of construction was carried out exactly as normally for a non-opening model, with the exception that one end was of course omitted. The sides and ends were mass-produced from a sheet of 1-mm. plywood, scribed in the mass and having strapping affixed in adhesive paper strip. Two sides and one end were thereafter fitted to each chassis, the joints

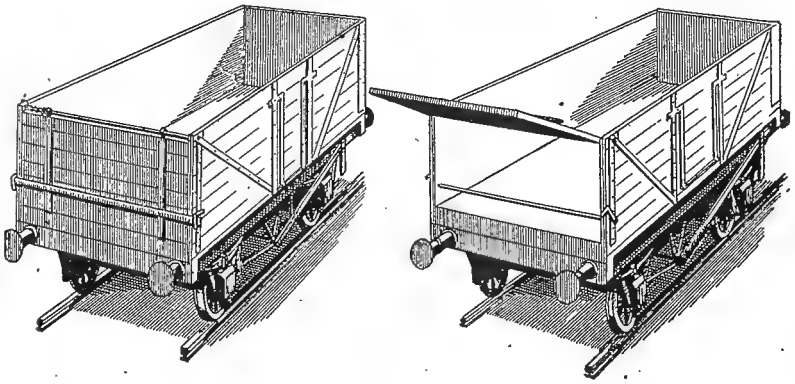


FIG. 88.—Perspective Sketches showing arrangement of End-Door

being of the same strip to represent corner-plating. The next step was to form little strengthened "plates" on the extreme upper corners of the sides by using tiny lapped-over pieces of adhesive strip. These were pressed in the wood-vice and left to dry.

The doors themselves were not made from plywood but from 1/16-inch thick soft fretwood. They were cut with a pocket-knife to make an exact snug fit, leaving a shortage along the top edge to allow for the depressed hinges. The vertical trusses on the end-doors were of thin wood strip, glued on and projecting a little at the base to form an abutment; this is a matter of appearance, for the cross-beam on the end-door serves the same purpose. An easier way would be to fit the cross-beam and afterwards to add the trusses in paper strip. The sides, the fixed ends and the fillet at the opening were fixed with glue and pins

from which the heads were snipped. These can be seen in the elevation drawings. (A) is the shaped fillet, which is shown both in and out of its place. (B) is the end-section of the door. It shows the position of the cross-beam and the manner in which the little hinges are bent backwards after being fitted in order to give the correct throw to the door, and to allow the hinge-bar hole to be placed well back into the side. It then coincides, as it should, with the position of the vertical strut on the side near the opening end. The tiny hinges were made from Varney's pin-eyes, and came ready made. But if these are used they must be inserted into holes first made with a slightly larger pin, for the eye-pins have no points. I recommend the use of a larger pin and pliers for the forming of all the holes involved in the work, and some care is required in piercing those which

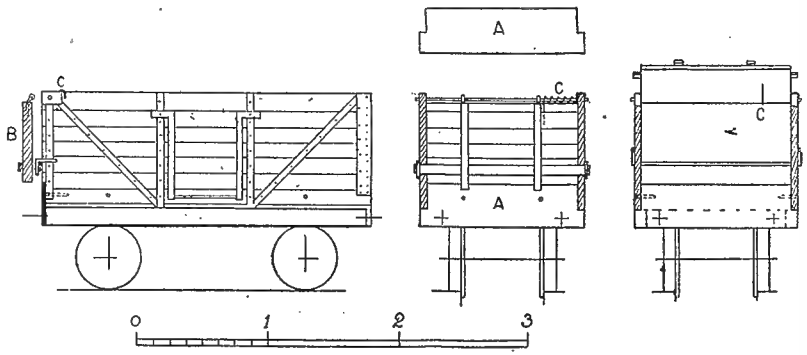



FIG. 89.—Elevations of a Small-Scale End-Door Wagon

take the hinge-bars. But it will be found that the plywood is very sturdy and does not easily split. I had no experience, in making six wagons, of any splitting at all.

When the door has been completed and the hinges set in, the hinge-bar is made from a piece of fine and rather soft wire, a little smaller than the size of the boring pin. A length of this, about four inches long, is slotted through the side-holes and the eye-pins, and the door is hinged in place. The wire should be sandpapered before use. When the door is hung, touch each of the eye-pins with solder, snip off the long strands of wire projecting through the sides, and the hinging is finished. The door should now work with perfect sweetness, but should be slightly sandpapered if it binds.

The snag which holds the door in place when locked is simple but rather ingenious. It consists of one length of the

fine wire, having both ends shaped as shown in the perspective sketches. It passes through an additional pair of pin-holes in the sides. Needless to state, the ends cannot both be shaped before the wire is fitted ; but one end can be, and the second may easily be shaped with small pliers when the wire has been slotted. The position of the wire must be high enough to clear the discharging material that is carried as freight, so that the wagon completely empties itself when one end is raised. But the wire should not be higher than thus required, or it will look out of place. The snags themselves should not be ungainly, and they must be made to work with an absolutely simultaneous movement ; this can be done by using two pairs of pliers in the shaping of the second—holding the already shaped snag with one pair and shaping the other with the second pair. Note how the snag must neatly engage the cross-beam.

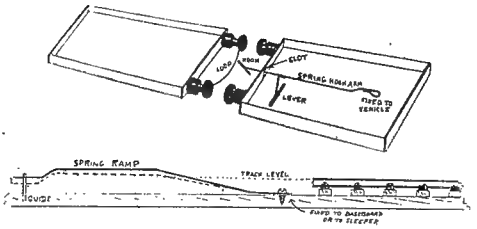
When I completed my half-dozen examples, my friend, Mr. Ian Frazer, paid me one of his kind but inexorable visits. I showed him an example, but it did not please him in that it required the intrusion of the hand to open the door from the inside of the vehicle. So the notion was developed of attaching a light spring at one end of the hinge-bar (marked C). This consists of about one inch of softly sprung wire, twisted around a stout pin and then slotted on the hinge-bar. The doors can readily be removed for this purpose. One end of the spring is slightly, and almost invisibly, hooked over the wagon side ; then the door is swung right over inside the wagon and the other end of the spring bent right back to touch the door and to point downwards on the inner side. The result is perfect—on lifting the snag, one side only, the door swings right up ready to discharge the load.

When you have made one of these models, if you are at all like me, you will want to make a lot, and will not be content until all your so-called end-door wagons are thus made perfect. Incidentally, I suggest that this is an excellent scheme for the present improvement of rolling stock when new wagon chassis cannot be had, and I really think these are the first actually-operating wagons of this type in OO-Gauge.

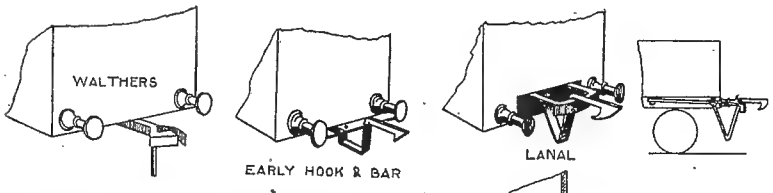
## MINIATURE-GAUGE COUPLING AND UNCOUPLING

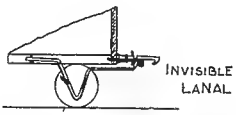
It is notorious that in the matter of automatic couplings for miniature scales the Americans have easily outdone us. When all the markets for materials are again open, our friends across the Atlantic will have goods to offer that should either secure British customers or cause our home manufacturers to take notice. Long before the war, for O-Gauge devotees, the American Buckeye coupler had been not only perfected as a miniature mechanism, but had been rendered capable of automatic manipulation to a degree of perfection.

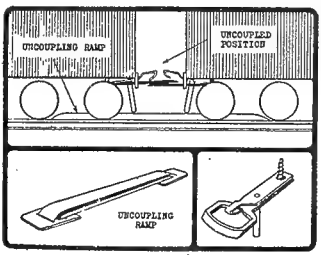
New beginners in railway modelling, of whom there are apparently thousands despite the times, may not be conversant with the history of this tantalising mechanism. Let us begin for their benefit at the beginning. Auto-couplers for OO-Gauge began in this country with the effort and skill of Mr. A. R. Walkley. His ingenious scheme is shown in his own drawing herewith. The idea was simple—one of those simple ideas which we wonder had not occurred to us long before—and it had some striking qualities, many of which have not been surpassed. It was simple and cheap to make, was most inconspicuous, and it was highly effectual. It was also both a coupler and an uncoupler. It had two weaknesses : it was a " one-end-only " contrivance, and it did not centre automatically. But for 1933 it was a great discovery. The next favourite was the old hook-and-bar type, of which I have applied and used hundreds. This was definitely no improvement upon its precursor, for it had all its faults, and was ugly into the bargain. The only advantage it did possess was that of being the first " either-end " type. Until the advent of the now famous LaNal uncoupler, it had no competitor of a serious kind. The LaNal was the invention of Allan Rice, an American, popularly known in his own country as " the father of HO." Merco took up its manufacture in the British Isles and, if I remember aright, it had an American brother. However that may have been, it certainly had an American development in the form of the Mantua coupler illustrated, a mechanism which has proved extensively popular over the water. Immediately prior to the present war, the writer talked, thought, and experimented a great deal with a view to an improved LaNal in which the ugly drop-V-bar would be relegated to a position behind the wheels



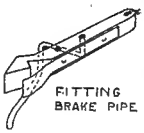

WALKLEY

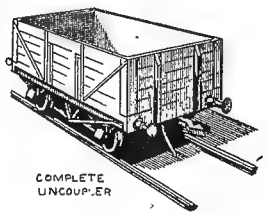


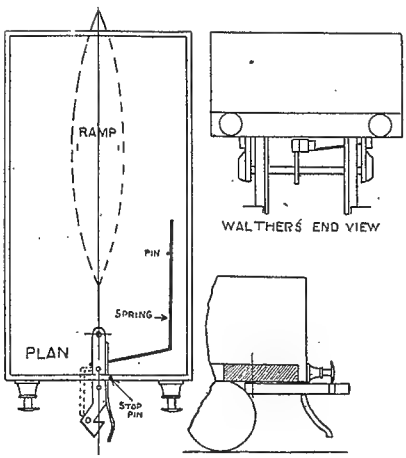



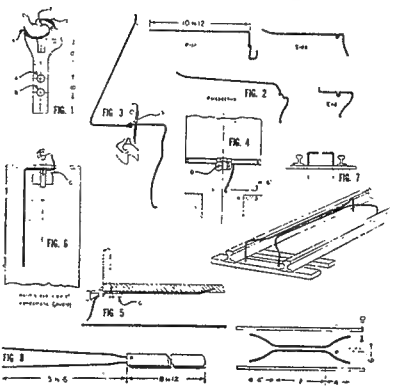




MANTUA




HEUBENTHAL

FIG. 90.—Auto-Couplers for OO-Gauge Stock

of wagons (see the diagram). Its name, in the writer's mind, was the Invisible LaNal, though, sadly enough, it was far from being invisible. It could well have been adopted to all forms of stock. Mr. Edward Exley has very recently brought out an improvement for use on bogie stock, in which the same device, quite differently designed, is attached entirely to the bogies. This is excellent mechanically, though just as ugly; yet, like the LaNal, when properly adjusted, it works infallibly both for coupling and uncoupling trains.

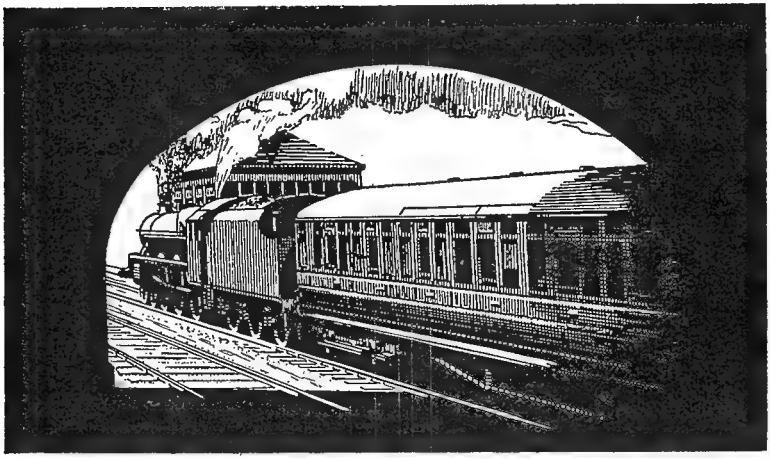
I have myself always thought that the ultimate triumph in miniature couplers would take the form of the knuckle type—some kind of adaptation of the Buckeye. During the early days of the war, my friend W. K. Walthers sent over to me samples of his new venture in this form. At the time of its arrival a multitude of matters crowded aside my attention, and it is only now that I have been able to give the sample a thorough test. Whether it is known to anyone over here I am not aware; but it seems to me to be the final solution. My attention was actually re-directed to this sample when I recently saw a suggestion by R. H. Huebenthal in the *Model Railroader*, whose scheme cleverly incorporates a dummy train-pipe and a spring mechanism as part of the uncoupling device. It suddenly dawned on me that this scheme, coupled with the neat and admirable Walthers mechanism, would accomplish the ideal. I give Mr. Huebenthal's drawings, with full details of the Walthers coupler, and my own suggestion for the incorporation of the train-pipe as an improved method of manipulating the uncoupling.

It can be claimed for this suggested scheme that it can be adapted to any type of vehicle, that it will couple or uncouple automatically on straight or curved track, that its uncoupling ramp is most inconspicuous, being of the lifting kind, that it has the neatest appearance of any coupler on the market, that it involves no mutilation of wagon or coach ends, that it is simplicity itself to fit. It also possesses the new features of being a pusher as well as a coupler—trains can be pushed along without coupling, or instantly coupled by the slightest extra insertion of juice into the track; also of being capable of hand-coupling by merely tilting the end of one vehicle. The mechanism takes the sharpest curves admirably. It also happens to be as cheap as any standard coupler on sale.

The arrangement of the spring and stop-pin is simplicity itself, any piece of wire—such as that used with Mercontrol tubing

—being suitable. The idea behind the addition of the train-pipe and the removal of the straight drop-pin is simply that of enormously improving the appearance of the outfit. Another advantage, however, is that by placing the engaging-ends of the drop-pipes slightly farther apart, any risk of the ramp end fouling the otherwise slightly closely spaced pins is eliminated.

I prophesy for this mechanism a big sale after the war; certainly I intend, when goods can be honestly bought from America, to fit the Walthers coupler to all my West Midland stock. Not the least important feature about it is that it is designed for 3½-mm. scale, and is therefore possessed of an enhanced appearance when fitted to 4-mm. models.



## SHORT COACHES FOR SMALL LAYOUTS

IT rarely seems to have occurred to beginners that on a layout confined to a small area there is no need whatever to run coaches of the standard main line or even the normal suburban length. On such a layout there may quite likely be a necessary curtailment of curve-radius at certain points, and overhanging coaches have a most unconvincing appearance. Furthermore, there is something most charming about the ancient vintage —and for that matter the modern type—of six-wheeled vehicle in passenger service. Recently, when the writer was given the privilege of choosing several trains as Christmas gifts from his family, one of these decided upon was a six-coach train of correct flat-roofed L.M.S. vehicles each with six wheels, and they are most fascinating models, fully as attractive in every way as the main line train or the articulated excursion set.

Numerous excellent designs have recently been given in the *Model Railway Constructor* by Mr. F. W. Chubb, and two of these are here reproduced with his permission. One has been chosen because it is not only a short vehicle but is mounted on bogies,

which should bring it within the favour of those who dislike non-bogie trains. It is only six inches in length in OO-Gauge, but it is a faithful model of a G.W.R. suburban type, and was in service as recently as 1924. More interesting still is the fact that, exclusively of a pair of these coaches, the remaining vehicles on the trains were four-wheeled, a design for these being also given.

The advantages of using such trains as these, along with lighter or—at all events—shorter tank engines should be obvious.

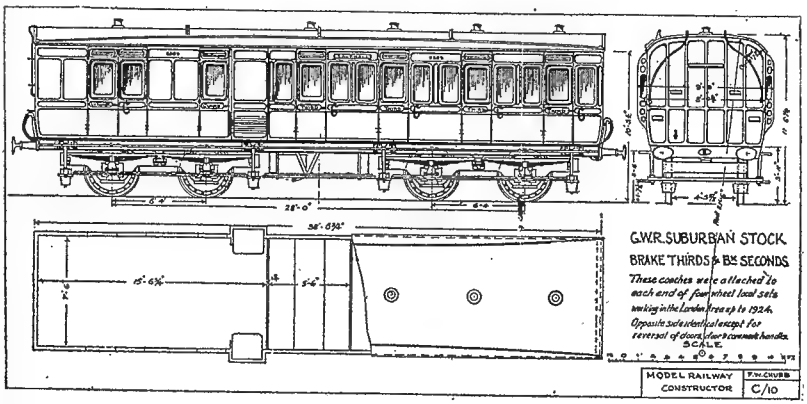
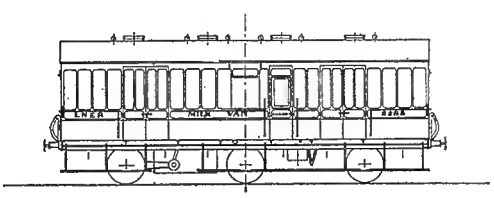

G.W.R. SUBURBAN STOCK.
BRAKE THIRDS & BY SECONDS.
These coaches were attached to each end of four wheel local sets working in the London area up to 1924.
Opposite sides identical except for reversal of doors, door furniture, handles.
SCALE.
MODEL RAILWAY CONSTRUCTOR
F.W. CHUBB
C/10

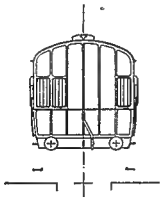
FIG. 91.—Designs for Typical Short Coaches for Restricted Layouts

Much less space is occupied by the trains themselves ; shorter platforms are possible ; smaller stations and more of these can (if desired) be thus accommodated in the space ; curves can be of sharper radius ; there is much less overhang and less tendency to buffing troubles ; and there is just as much charm in modelling and operating a " light railway " or " suburban line " layout as there is in owning the most ambitious main line. A final advantage lies in the fact that the vehicles are exceedingly natty to model, and can be handled in all manner of places and under all kinds of circumstances while the worker is engaged upon their building.

For those who prefer something more modern, two other designs are furnished which represent vehicles of quite recent manufacture. One of these is the North Eastern milk van, built in 1920, for the design of which I am indebted to Captain Fleetwood Shawe. A full train of these coaches might well

form an integral unit on any layout. Captain Shawe has also provided a photo of this unit. The original of the L.M.S. milk van is an even more recent innovation.



LEADING DIMENSIONS.

| | | Other Nos. |
|---|---|---|
| Length over Headstocks. | 32' 6" | |
| Width at Waist. | 8' 8" | 2269 |
| Height (excluding vents). | 12' 7" | 2275 |
| Wheels. 3'4" Spoked. 10'6" Centres. | | 2300 |
| Brakes. 2 Blocks on each of the 4 end wheels. None on centre wheels. | | 2324 |

NOTE.

There are four windows in one end, two in the other. The dynamo, accumulator-box, and the breaks in the footboards on both sides, are located at the end in which there are four windows.

The actual L.N.E.R. Milk Van

FIG. 92.—L.N.E.R. 6-wheeled Milk Van

So rarely are these smaller vehicles either modelled or provided in model design and so completely do they solve the small-layout difficulty, that it was thought useful to give these suggestions. Other, and equally commendable prototypes, of

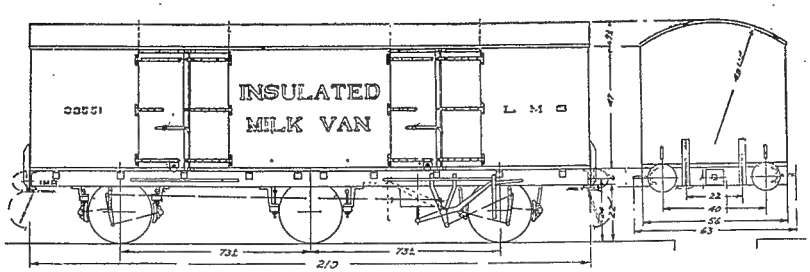
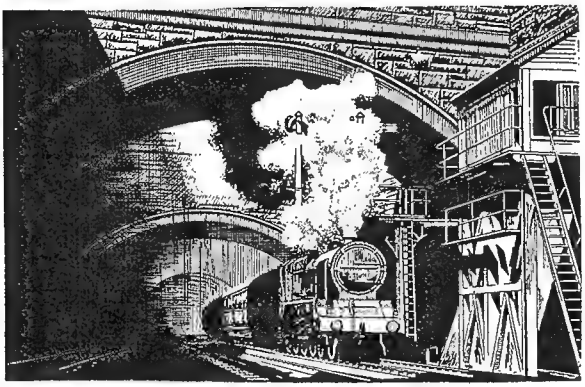



FIG. 93.—An L.M.S.R. 6-wheeled Insulated Milk Van

course, are plentiful, and the prospective builder is strongly advised to give due consideration to their utility.

There are a large variety of other forms of short-coach traffic from which the operator of exclusively short vehicles would not be precluded, such as camping coaches, engineer's trains and sleeping vans, inspection trains, mobile warehouses and so forth.



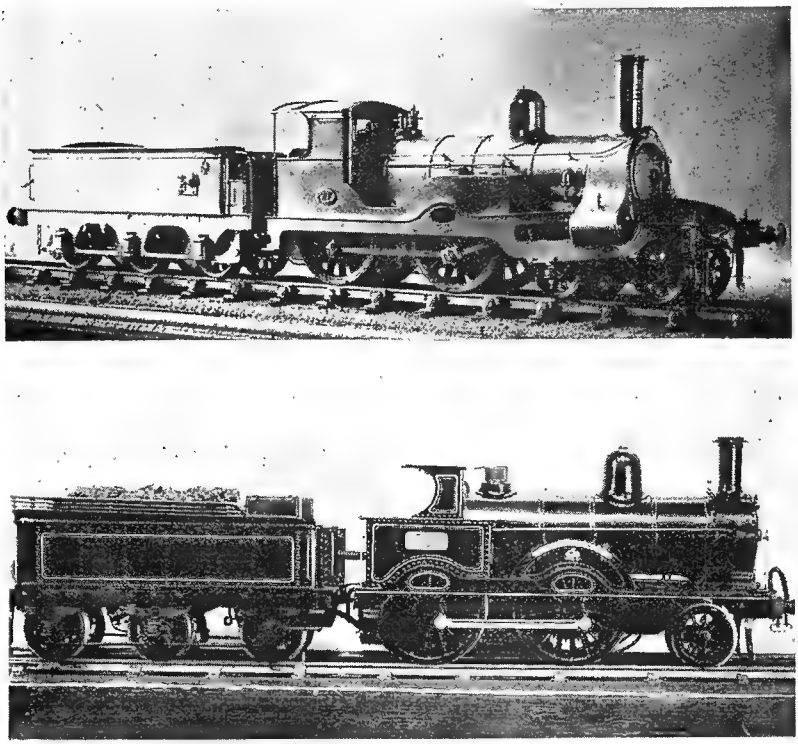
## LOCOMOTIVE STRUCTURAL SUGGESTIONS

THE past few years have been by no means rich in their harvest of new notions regarding locomotive construction; it has been almost impossible to obtain standard materials, and the majority of enthusiasts have been so fully occupied on other compulsory duties as to have had little margin of workshop leisure. Yet there have been exceptions to this general statement, and many workers have sent in to the periodicals their various suggestions, though often in a more or less hap-hazard manner.

Commercial products immediately prior to the outbreak of war had reached in all the smaller scales a high degree of perfection; the several photographs here included will bear out this statement. In O-Gauge, the samples by Exley & Co. of the "Skye bogie" Highland type and the historic "Hardwicke" are representative of the work of this firm. Two excellent examples by Reidpath of OO-Gauge engines, one for the layout of Mr. J. R. C. Miller of Venezuela and the other for Mr. Halley-Brown will speak for themselves. Nor were the commercial houses by any means in advance of certain expert amateurs in this respect. Mr. Perrier's Stanier 5XP type is a fine piece of work, and a most interesting product by Mr. R. G. Vacy-Ash of a cast body adaptation on the lines of suggestions given in *Scale Railway Modelling To-day* is also depicted.

Several excellent models were built for this owner by Walkers & Holtzapffel, one of which, an L.M.S. Kirtley, is shown. Interesting also in a high degree is the Pacific tank built on a Varney Parific chassis and mechanism and equipped mainly with Varney fittings, of which more will later be said.

In Fig. 94 will be found a number of more or less new ideas for which acceptance will be found by builders of locomotives



" Skye Bogie " and " Hardwicke " O-Gauge Models by Exley

in the small scales. Mr. Ahern's discoveries are always valuable, and two of his recent suggestions apply to the chimney and bedplate of a L.N.W.R. type engine. Wheel splashers are also a difficulty, and his scheme for turning these up from the footplate sheeting is most useful. A still more ingenious notion was contributed to the *Model Railway News* by Mr. Perrin of the Harrow Club, applying to the construction of the bogie side-frames for a Caledonian " Cardean." model built by Mr. A. J. Thorn. It was found that to model the tender under-

frames in correct underslung style would not permit negotiation of reasonable curves. The scheme was therefore adopted of constructing the outside frames as a fixture, and arranging the bogies, built from brass channel, to swing inside these frames. Standard cast axleboxes were inverted and bridged by stretcher frames above.

Dwelling still upon the subject of tender underframes, it is often found necessary to build these up from German silver or stout tinplate strip in the manner shown in the succeeding sketch. A great deal of trouble and awkwardness can be avoided by using the writer's own method illustrated. A piece of 1/16-inch wire is inserted in the journal of the axle box, the requisite number of apertures having first been cut in the metal

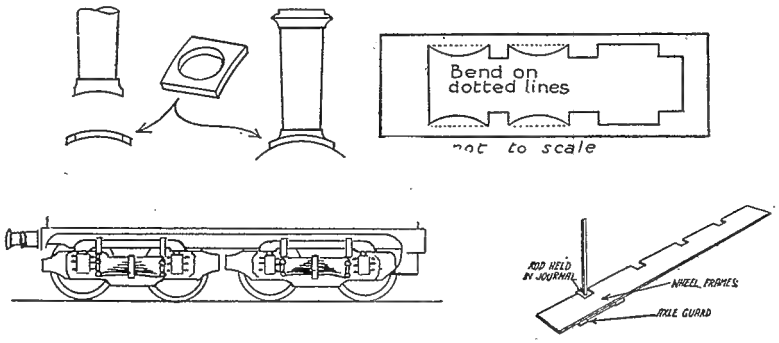


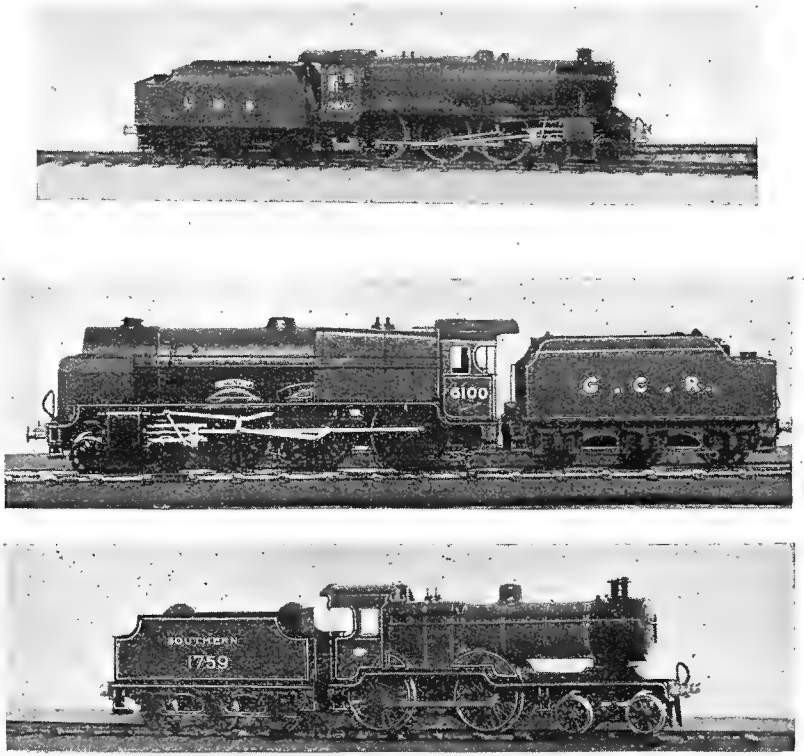

FIG. 94.—Recent Ideas in Locomotive Construction

side frame. The outer surface of the frame is first lightly tinned with solder. The wire holder is then held in the fingers, the frame held with the remaining fingers, and the sweating carried out with a hot iron from inside the frame. In this manner the danger of melting the axleguard is avoided, though even by this method the heat must not be applied for too long a time. When the four guards are fitted, it is an easy matter to lay the completed side along the second strip, and thus to get the axleguards exactly in line with and opposite to each other.

In connection with the adapting of engine wheelbases to the taking of curves, a most interesting suggestion was recently made by Mr. F. J. Roche in a design for a Stirling single type locomotive. In this instance, by leaving sufficient play for each pair of wheels, the entire wheelbase was otherwise left rigid, no swinging action being given to the leading bogie or the trailing truck. The idea is incorporated in the sketch

(Fig. 95) for which I am grateful to the *Model Railway Constructor*. It is not difficult to imagine the same scheme applied to other wheel arrangements and to other classes of engine.

The quartering of locomotive wheels is an exacting task to the most expert of workers. The scheme for carrying out




Mr. Perrier's L.M.S. 5XP, Mr. Miller's "Royal Scot" and Mr. Halley-Brown's 4-4-0 Locomotives in OO-Gauge. The latter two are Reidpath products

this work (Fig. 96) comes from the *Model Railroader*. It is a more accurate method than that of the surface gauge, and it consists in building up an exact right-angle of wood to the length between the wheels. This angle should have sides somewhat longer than the throw of the crank-pin. A pair of pins or studs are then turned to fit inside the crank-pin holes and having a diameter on the inside end exactly equal to the axle diameter. The wheels are then turned around so that these pins are tight

against the insides of the axle and the insides of the angle on each end, which means that the wheels must be exactly at quarters. The wheels are then forced tight on the axles. The drawing gives the exact procedure.

The notion for fixing the wheels of tenders (Fig. 96) is not new, but it is quite a recent innovation, and is most valuable. Instead of fitting the outer ends of the axles into the journals of the axleboxes, the side frames are in the form of dummies, built up in the manner already described ; and the axles them-

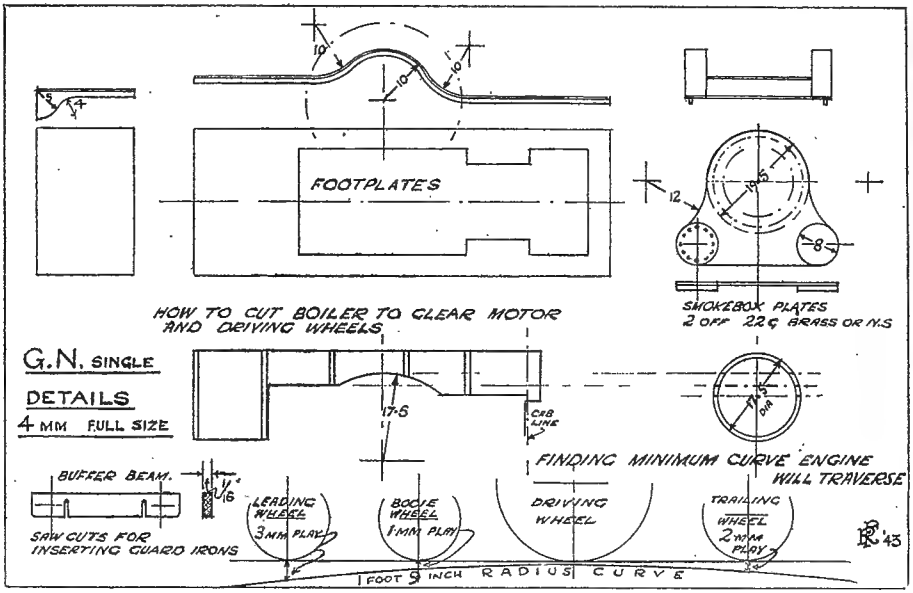

FOOTPLATES
HOW TO CUT BOILER TO CLEAR MOTOR AND DRIVING WHEELS
SMOKEBOX PLATES 2 OFF 22G BRASS OR N.S
G.N. SINGLE
DETAILS
4 MM FULL SIZE
BUFFER BEAM.
SAW CUTS FOR INSERTING GUARD IRONS
LEADING WHEEL 3MM PLAY
BOGIE WHEEL 1MM PLAY
DRIVING WHEEL
TRAILING WHEEL 2MM PLAY
FINDING MINIMUM CURVE ENGINE WILL TRAVERSE
1 FOOT 9 INCH RADIUS CURVE

FIG. 95.—Mr. Roche's Details for an Early G.N.R. Single Locomotive

selves run in lengths of soldered tubing attached to the channel section of the underframe. By making the outer lengths of tubing slightly longer than the central length, some play is given to the middle pair of wheels, making it an easier matter to negotiate sharp curves.

One of the most troublesome items of locomotive modelling is the springing of bogies and pony-trucks. I have therefore gathered together a number of ideas which should prove useful for this work, and these will be found in Fig. 97. In (A) we have a scheme of my own applied to a West Midland Mogul engine which previously gave endless trouble. The truck frame (a commercial job) consists merely of a shaped piece of stout

copper wire soldered to tubing through which the axle moves. The material for the spring was simply a piece of alarm-clock hair-spring, shaped as in (E), arranged to bear down on the

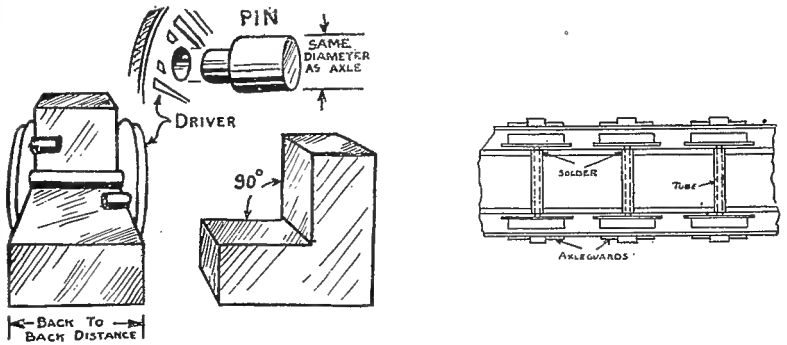



FIG. 96.—Quartering of Locomotive Wheels and Attachment of Wheels to Tender

tubing and soldered securely at the two upper loose ends. On the truck pivot there was soldered a metal block, as shown; then the spring was soldered to a suitable washer, this being

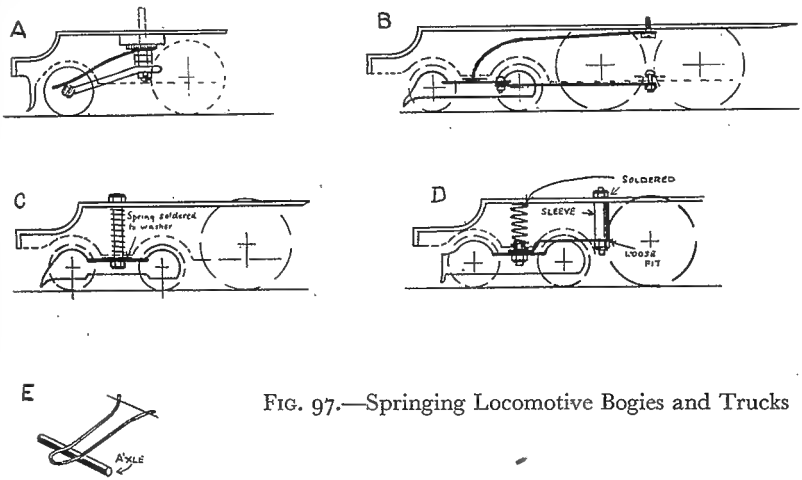
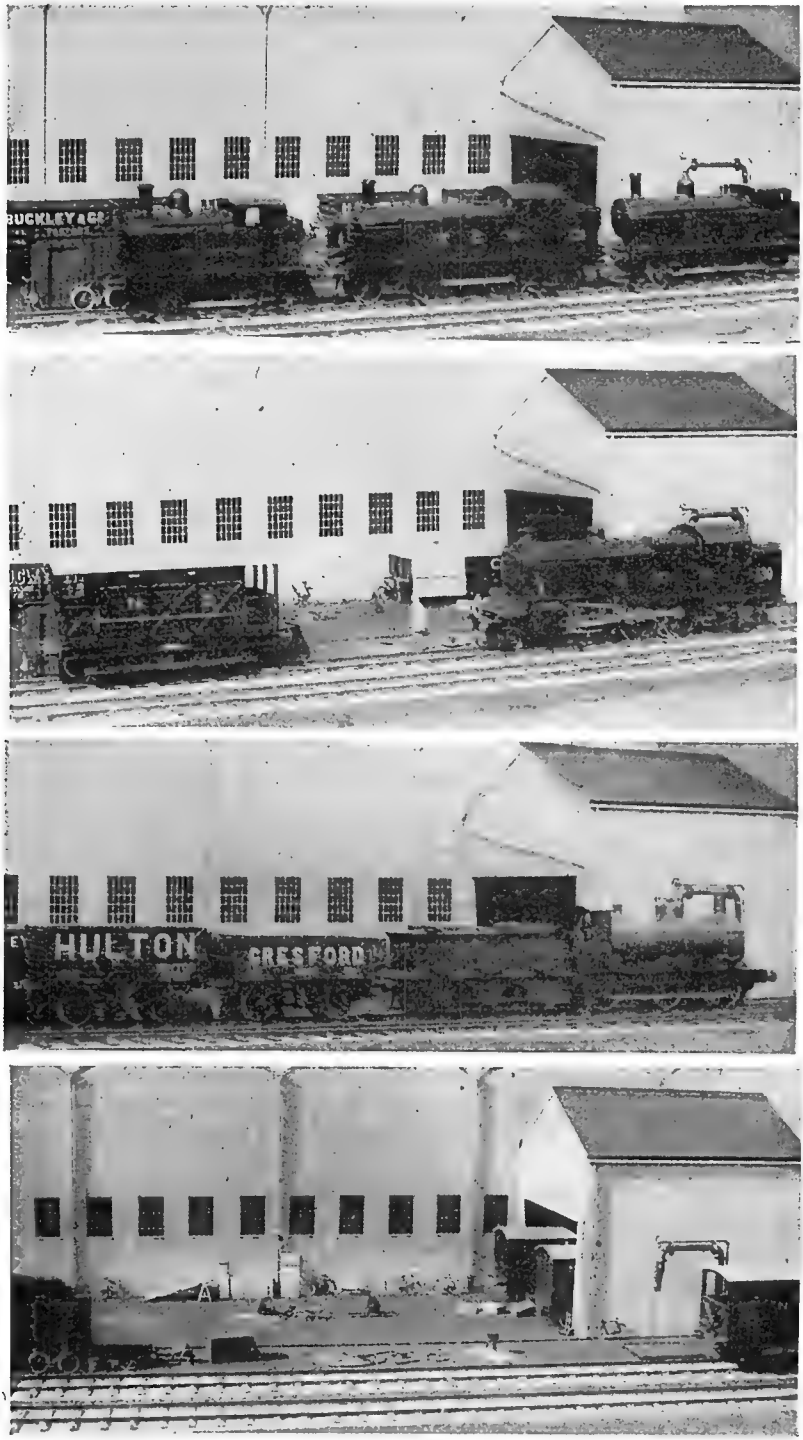



FIG. 97.—Springing Locomotive Bogies and Trucks

screwed with a nut tightly in place. Two other nuts serve as distance pieces, and the truck frame was left with a free and loose movement. No further trouble has been given by this engine since the scheme was adopted.

The suggestion of Mr. Perrin, next illustrated, is extremely




Locomotive and Other Models on Mr. Vacy-Ash's Railway. *Top*: Normal Cast Body Engine (at rear) and Two Adaptations. *Second*: Varney Pacific Mechanism on British Tank. *Third*: Kirtley Engine by Walkers & Holtzapffel. *Fourth*: Pushcycles and miscellaneous freight at Goods Depot

workmanlike, and was described in a recent issue of the *Model Railway News*. This is applicable to all forms of engines with leading bogies, and it will be noted that the spring possesses a flat buffer which slides along the surface of the bogie frame. A similar scheme, that of (D), was applied to a Pacific engine on the W.M.R. seven years ago and is still in use. But here, the method is more primitive ; a length of spiral spring is simply soldered to the underside of the footplace, and its lower end, being slightly opened, fits on the top of the bogie-pin. The method allows quite plenty of side-play with a desirable tendency on the part of the spring to draw the bogie to the centre. In (C), we have the well-known common method applied to leading bogies, wherein a spiral spring is slotted over the bogie pin, the bogie swinging by a lateral slot.

## DESIGNS EMBODYING NEW DEPARTURES

During the war years the commercial houses have, so far as scale models are concerned, been at a practical standstill, with but very few exceptions. The most significant advances that have taken place during these years may be said to consist of the standardisation of dimensions by the British Railway Modelling Standards Bureau and the resultant creation of " Scale OO-Gauge " and the " Standard OO-Gauge " categories, together with certain experiments by amateurs in the application of reputable mechanisms like the Hornby Dublo and the Varney American to model types for which these motors were not originally intended.

Mr. F. J. Roche's design for a OO-Gauge Stirling single locomotive, which appeared recently in the *Model Railway Constructor* embodies some quite unusual and advantageous features. It is to be noticed first that the design is made for the new 18-mm. Gauge " Scale OO " Standard. The side profile of the model, of course, is equally suitable for either OO-Gauge standard, the only departure from earlier procedure attaching to the track-gauge and wheel dimensions. The design incorporates a complete set of cab-fittings (Fig. 98) and the structural details (Fig. 95) are very interesting and complete, the fixed wheel-base already mentioned being a valuable idea.

The Hornby Dublo mechanism, so difficult at the present moment to obtain, is an excellent motive unit, and has the

good property of being designed to operate on 12 volts, which renders it acceptable for future as well as present usage. It can be applied without extensive alteration to several types of engine other than the two examples retailed by the firm prior to the war, the tank engine mechanism will suit high-boilered 0–6–2, 2–6–2 and 2–6–4 engines, and the tender mechanism adapts itself to the same types of tender locomotives. A little exceptional forethought in design also rendered the motor and chassis acceptable for use with a heavy Consolidation engine.

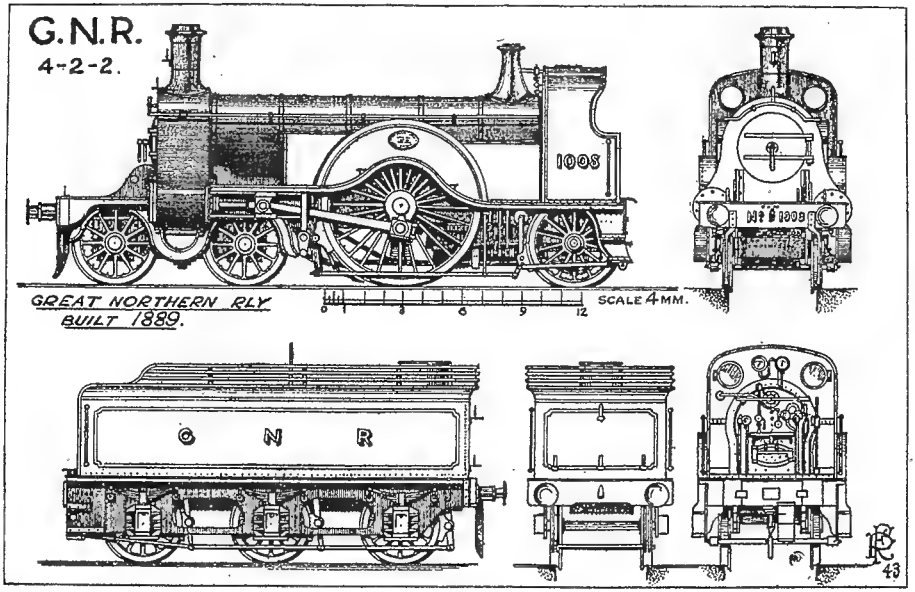
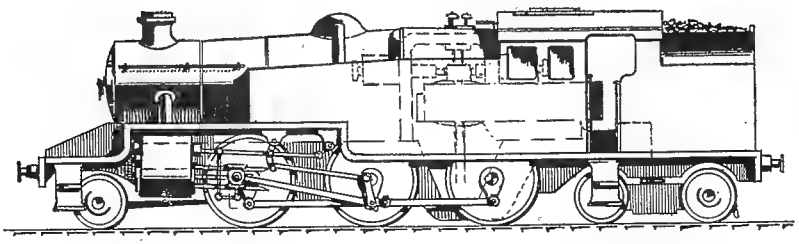
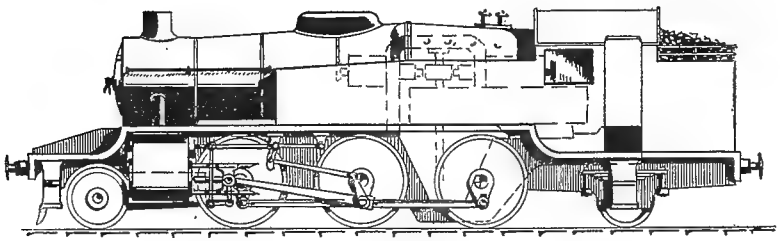



FIG. 98.—Mr. Roche's Design for a G.N.R. Single

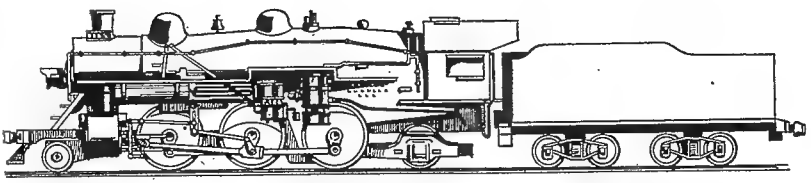
Several possible designs have been made and are given in Fig. 99. The mechanism works admirably into the outline of an L.M.S. 2–6–4 tank type, and the free-lance Prairie tank is a fairly attractive model. For the Consolidation freight engine—a type very rarely seen in the model realm—the addition of the rear pair of coupled wheels forces the motor rather far forward beyond the capacities of the firebox, but if a small casing is included, as shown, to accommodate the front portion of the magnet, a good design can be made without sacrificing anything in the finished appearance. There are numerous possibilities for the Dublo mechanism as applied to American types, which are frequently included by amateurs on their British layouts under the title of " Austerity "



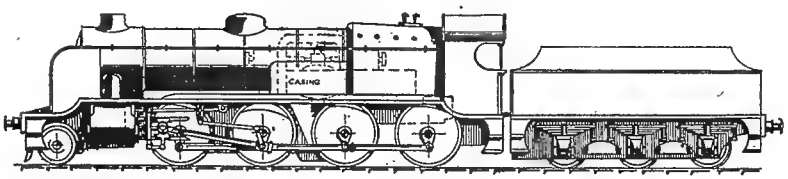
With L.M.S. 2-6-A Tank



With Free lance 2-6-2 Engine



With Varney Pacific Superstructure as 2-6-2

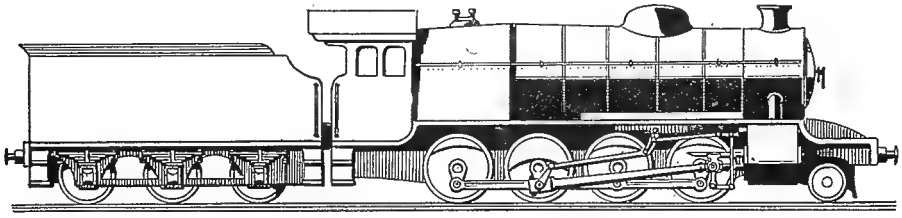



With Free-lance Consolidation Locomotive

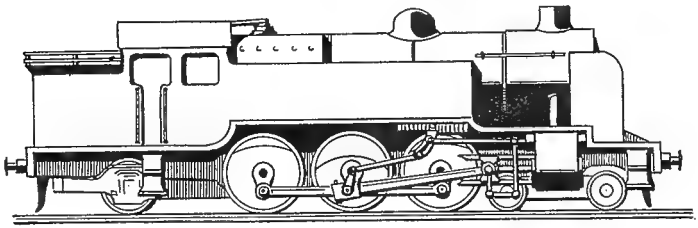
FIG. 99.—Various Uses of Hornby Dublo Mechanism

engines. A fine example of the American Prairie type was recently described in the *Model Railway News*. The design of Fig. 99 has a Varney Pacific superstructure, as well as Varney fittings.

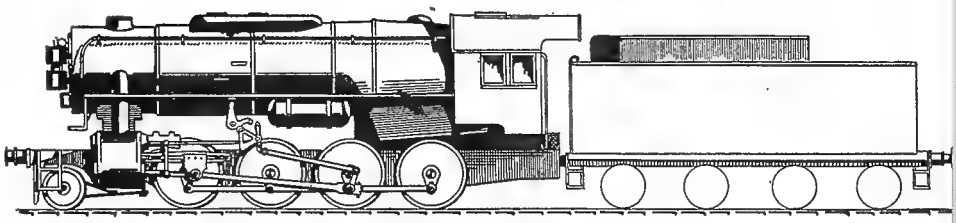
The Varney motor itself is a powerful unit in HO-Gauge, and is almost standard throughout America for all types of



Consolidation (British Type) with Varney 2-8-0 mechanism



British Tank with Varney Pacific Chassis



British-American "Austerity" Engine with Varney Chassis

FIG. 100.—Some Adaptations of Varney American Mechanisms (OO-Gauge)

models in this scale, though the Mantua mechanism (a competitor) and the Pitman motor are also extremely satisfactory products. Mr. R. G. Vacy-Ash is the first amateur to my knowledge to have thought of applying the Varney mechanism to a British type engine, and a photograph of this model is herewith shown. A diagram offering a design on a free-lance basis is also given in Fig. 100. Here, a Varney Pacific chassis is used complete, and both the trailing truck and the leading bogie are Varney

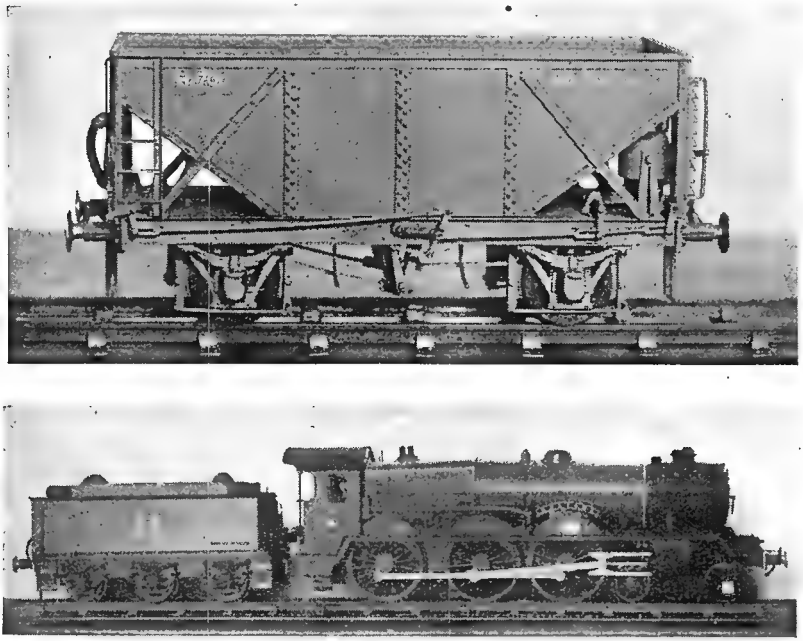
items. The Consolidation goods engine in the same figure has a Varney Consolidation chassis, with Baker valve gear, and either of these units would make a very powerful freight hauler. The list of possible designs, utilising the different American mechanisms, is without limit, for these latter are provided as Pacifics, Consolidations, Mikados, Atlantics and 0–6–0 switchers. The Mantua Atlantic chassis would provide correct power for an admirable British locomotive of that interesting and now almost obsolete type. Particularly adaptable to the Varney Consolidation mechanism would be a model of the American austerity war-time locomotives operating in this country, for a diagram of which the reader is referred to Fig. 100.

## CARDBOARD LOCOMOTIVES

In these days when metals for modelling work are difficult to obtain, there is an appeal about any material that can be easily had and that will stand up to the requirements as a substitute. Yet it is not in this manner that it is proposed here to discuss the merits of cardboard as a modelling medium. Strangely enough, whenever this material is thus named, there seems to be something of a novelty about the idea ; but cardboard as a substance for the modelling of engines is by no means an innovation. As structural material for rolling stock of all kinds its merits are well-known ; in the smaller standards many workers use nothing else, and the excellent work in O-Gauge, photos of which are included here by the courtesy of Captain Adams, will reveal that even in the larger scales it is not to be despised. Furthermore, as long ago as 1931 the writer never used any other material than cardboard for locomotive superstructures, the 0–6–0 tender goods engine in the photograph having nothing but its cab, wheels and mountings in any other substance, and being still in regular and unspoilt service. It happens that a week ago a large section of a ceiling cornice fell on this engine, but caused no damage whatever excepting to its paint.

The locomotive work of Captain Adams is, it will be agreed, perfection itself. This gentleman tells me that he has been using this medium for many years also, and that he is astonished that it is not universally popular. It is very strong, light and inexpensive, and it requires only the most elementary kind of tools for its constructional work. Captain Adams advocates the

use of Bristol board, and this takes sharp bends very readily and without a tendency to crack, while also possessing a good surface for finishing. It can be had, of course, in a variety of thicknesses. The engines illustrated have stood up to any amount of regular work, and are, it must not be forgotten, modelled to 7-mm. scale. When, however, they do meet with a mishap, the repairing of them is a most simple matter. After numerous failures in the painting of his finished models, Captain Adams



Two Elegant Cardboard Models in O-Gauge by Capt. Adams

resorted to the ingenious plan of having the card painted—that is, sprayed by a friendly garage proprietor—before use. When painted by hand, locomotives are given three coatings of good enamel, being rubbed down with pumice powder between each coating, and being finally polished with a silk handkerchief. The result is a clean matt surface. Spraying, however, is found to be an ideal finish which may be either left matt or polished. Considerable care is required in building from this prepared card not to damage the paint during the working process. Funnels also are made with paper and card, as well as all springs and axleboxes ; but commercial domes are used. The

fullest detail is put into the work of this excellent craftsman, as will be obvious. With the exception of tyres, buffers, couplings and handrails, cardboard is the only material used, with the occasional exception of a strip of wood.

Another enthusiast, Mr. H. Underwood, recently built a most outstanding model of a free-lance Atlantic type locomotive from the same substance. A detailed description of this unit appeared in *The Model Railway News* for May, 1940. Amusingly enough, the chimney was made first, and the remainder of the locomotive was built, so to say, around it. The reason for this putting of the cart before the horse was wise enough, for it was such small details as the chimneys which appeared to be the greatest problem, and these were dealt with first. If a man can build a correct locomotive chimney in card, there is nothing

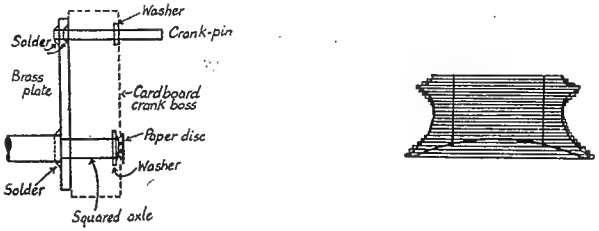



FIG. 101.—Mr. Underwood's Method of forming Locomotive Funnels and Bearings for Cardboard Models

whatever for him to fear in the remainder of the work. The builder's method of procedure is shown in the diagram—a scheme which the writer has found admirable for such items as lorry wheels in OO-Gauge. There are twenty-two circular discs of postcard in this particular chimney, all of varying diameters, and the solid production was "bored" by first using a red-hot needle and then continuing with sandpaper Cardboard 1/32-inch thick was used for the boiler, tube-plates, firebox, frames, wheel-rims, stretchers, saddle, buffer-beams, drag-plate and tender tank. Postcard was used for springs, cab, buffer-sleeves, footplates, valances, steam-pipe lagging-sheets, steps and spokes.

"The boiler barrel and firebox were made in one piece, and held together by a plated joint at the bottom. Stiffening was provided by three-layer tube plates and smokebox door ring, the latter being easily rebated to ensure a flush-fitting door. Wash-out plugs (squared wire) and mud holes were made,

together with " pop " valves made by wrapping gold chocolate paper round rubbed-down matchsticks. 1/16-inch strips gave the top and bottom flanges, and tiny pin-points were struck in the top to represent the spindles. The front tube-plate shows the tube ends, and a twelve element superheater is fitted. Steam-pipes, blast-pipe, blower and petticoat complete the smokebox equipment. The door hinges were 3/32-inch strips of cocoa-tin bent round and swung on a ½-inch dressmaker's pin. A bit of tinned wire and the head of a brass paper-fastener (squeezed once in a leather-punch to give the rim) provided a door-handle and wheel.

" The wheel-rims, bosses and balance weights were also made

A Scene on the Famous Layout of Mr. Norris (O-Gauge Fine Scale)

on a layer principle. The rim layers were cut out with a pair of compasses fitted with a suitable fragment of razor-blade wired into a split pencil. The spoke positions were then drawn on a piece of plywood (18° apart for 20-spoked coupled wheels), and a needle point stuck upwards through the centre. The boss was pressed on to this, and pencil marks made to show where the spokes would join. The rim was treated similarly, and both the boss and rim nicked with a razor-blade to receive the spoke-ends. Clipping the rim to the plywood, each spoke length was measured separately, cut from postcard, the ends dipped in glue, and forced into the nicks. Finally came the tyreing. Strips of cocoa-tin were cut, bent round the wheel and the ends soldered up on a plate 3/32 inch by ⅛ inch. A recess was rubbed on the rim to house this plate, and the tyre forced on. The flanges

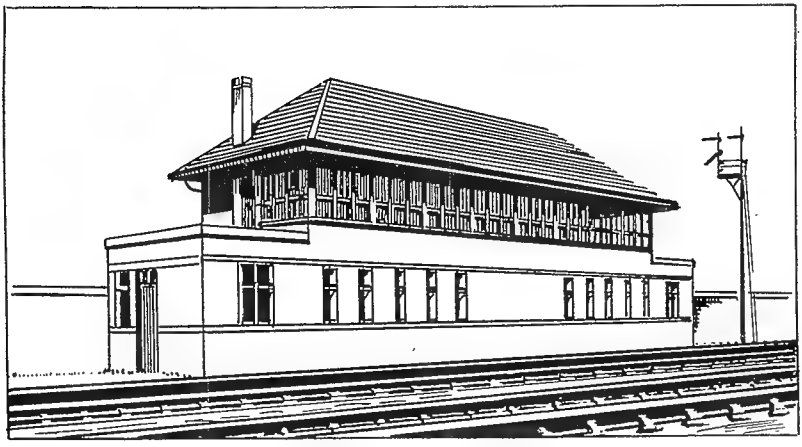
were made from tinned copper wire filed half-round, and soldered round the tyre. The result is a wheel that is surprisingly strong, and difficult to bend, let alone break, between the fingers and thumbs.

"To obviate the transmission through the cardboard of the driving strain from the coupling-rods to the axles, an all-metal drive was devised. A boss-shaped brass plate having a square hole, was soldered to the squared end of the axle (knitting needle), and a crank-pin soldered to the plate. The wheel boss was given a square hold for the axle, and a round one for the pin, whilst tin washers, sunk into the cardboard, were soldered to both. The axle end was then covered with a small paper disc. Fig. 101 illustrates this idea."

Mr. Underwood does not adhere exclusively to cardboard if it is considered that tinplate or brass strip will provide a stronger medium for movable parts. The cylinders and certain of the bogie components were of metal. Complete cab fittings are included in this excellent model, and power is supplied by a permanent-magnet electro-motor.

Apart from these outstanding examples, there have been from time to time during the past ten years innumerable instances of similar work for which the same material was used, and it is hard to understand the prejudice which prevents cardboard becoming a much more commonly espoused medium. It has long been the writer's contention that for almost any job where wood or metal are usually thought essential, cardboard may, for small-gauge work, take their place. It can be built up to any thickness, and the thicker it is built up the greater becomes its strength and robustness, while its finishing surface is in many ways better for locomotives than metal, for it not only takes paint but retains it ; and it lends itself to the utmost and most dainty detail work. The samples submitted to me by Captain Adams reveal this fact very clearly ; I can frankly say that I have never seen more exquisite work of their kind ; yet the specimens are such as could be produced by any amateur with the requisite care and patience. The work included tender and coach axle-guards, funnels, buffers, wheels (representing an ideal method of insulation) and a lovely example of a finished section of shaped and glazed coach side.

No special adhesives appear to be required. Captain Adams uses common tube glues such as Certifix, Seccotine and Duroglue, the latter having a quick-drying facility which is of value.



## PLACING OF SIGNALS

THE systems of signalling employed in the control of railway traffic in this country are various, but they mainly derive from what is known as the block system, of which there are several developments and improvements. With the block system, the route is divided into sections, at the entry and exit of which a signal cabin is placed. The principle is that not more than one train can occupy each block at any time, the signals controlling the entry to each section requiring to be returned to the danger position before permission can be accorded to another train to proceed into the block. The length of the sections varies greatly with circumstances, and ranges from many miles, down to a minimum of distance. Developments and combinations of the block system range from the purely manual form of control to the automatic, in which the signals are controlled by the trains themselves. The latter method is rare, and is generally restricted to the method of light-indication, though there are instances of auto-semaphore signalling with the block system. The lock-and-block system is a combination of manual and automatic control, the trains themselves taking a share in their own protection.

The principle of block signalling can be reasonably well adapted to a model layout, though certain modifications are invariably necessary owing to restrictions of space and to the "human element" which is itself necessarily modified in such an instance. For example, the exact relationship between cabins is not easily carried out where there is only one operator, or at the most, two. And again, shortage in extent of track may involve the elimination of distant signals, though these are an integral part of block signalling itself. For our purpose, then, the block system might be discussed from three aspects —that of the main line; that of passenger stations which are, in working, a vital part of the main line; and that of freight and other yards which may be worked to a very great extent independently of the main route.

(1) The block system as applied to a real main line is shown in a sketch at (A), as it would relate to one side of a single road. Here, (S) means starter, (D) means distant, and (H) means home. The movements of these signals would in real practice be determined in every instance by bell-indications sent from one cabin to another. Cabin 2 indicates to cabin 1 that its section is clear and cabin 1 signals accordingly. The distant signal prepares the driver for the indication of the home signal, so that he moves prepared either to stop or proceed. The home signal is the main factor of control; the starter beyond it is related to it, and a train that is drawn to a stop at the home signal may not proceed until the starter beyond it gives permission. It will be seen that all these signals require considerable lineal space for their respective functions, as there must be at least, and sometimes much more than, a full train-length between each one. A scheme is therefore suggested in (B) for the better apportioning of the space and for elimination of some of the signals, as would be necessary on almost every model layout. Distant signals, where these are not entirely dispensed with, could be placed below home signals on the same posts. Moreover, from the standpoint of necessity alone, homes and starters might be made to function as one, for if the signals are made to control the current it would be perfectly feasible to ensure that the home signal, when at danger, would cut out the supply of current to the section of track immediately in front of it, so that when set at the off position the semaphore could once more throw in the current.

The actual arrangement of the block-sections is another

matter which, to a large extent, must be settled by the restrictions of the style of the layout itself. Normally, it might be possible on a lengthy main line to proceed correctly with this division, but more often it will be found that blocks will have to coincide with sections of the main line that would at all events require to be separately controlled. Other blocks will have to occur with special track formations such as junctions and slips and

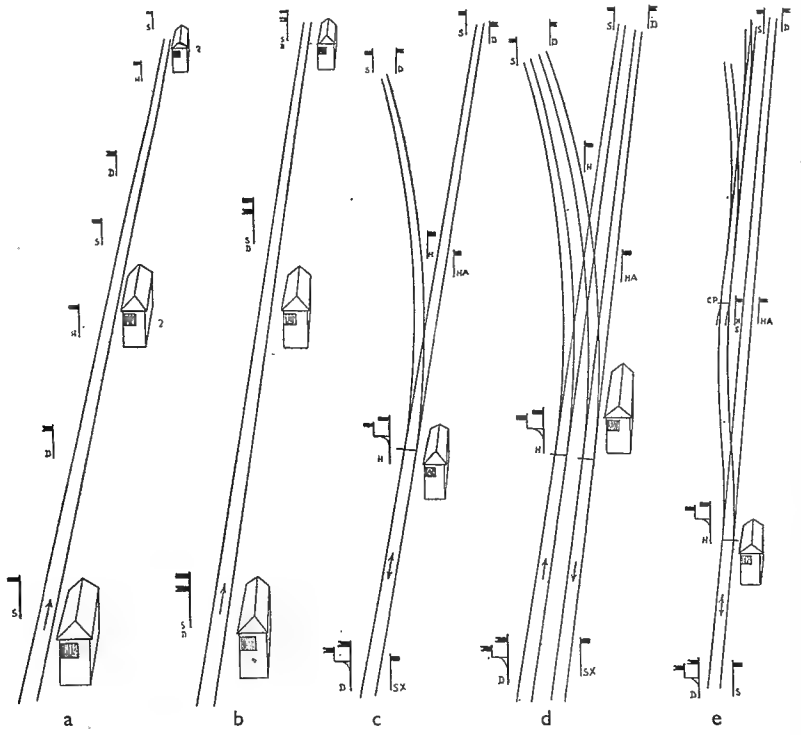



FIG. 102.—Signals for Straight Track, Turnouts, Double Junctions and Freight Yard Siding

sidings, or passing-loops and crossings. The signalling of a double junction is shown at (D), and is fully exact as in real practice. It is important to remember that there must be adequate length for a full-sized train between each location. The purpose of the two outermost starters in the drawing is in order that a train, allowed to proceed only as far as the home signal at the cabin, can be held up, say, within the turnout, instead of blocking the main line straight. The single turnout

(C) is signalled just the same, there being traffic in both directions. The starter at the extreme lower end, or front, of the drawing (SX) could, on a model system, be made to

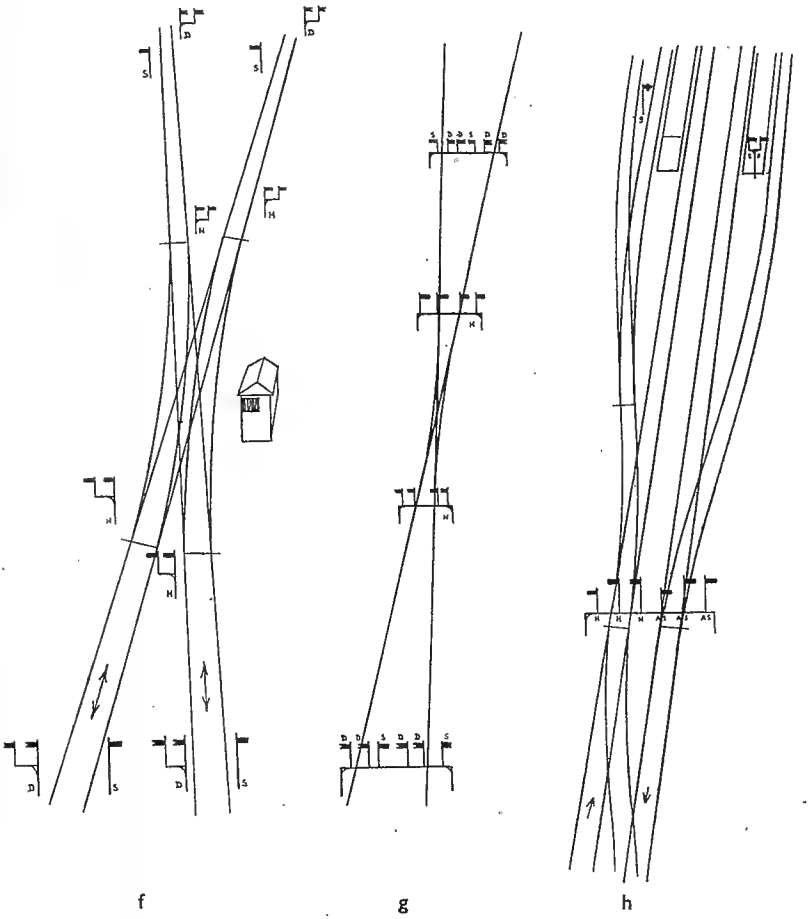



FIG. 103.—Signals for Double Slips and a Double Road Station

coincide with the home signal (HA) on the straight track near the cabin.

Other suggested signalling layouts in conjunction with main line work are given in (E), (F), and (G). The first depicts the arrangement of an ordinary siding, leading into a freight yard, and turning out of single track. The location of the catch-points should be carefully noted, these safety-points being interlocked

always with the siding starter. In (F), we have the arrangement where a double-slip might occur on a main line, though the signalling of such a formation might be considerably modified where slip-points occur (as they more often do) along with other combinations at a station. The placing of distants and homes and starters is fully given, but all the starters may be omitted and amalgamated, so to say, with the homes, if this is found essential within space limits. The sketch (G) indicates what may be done by way of grouping the signals on gantries for the

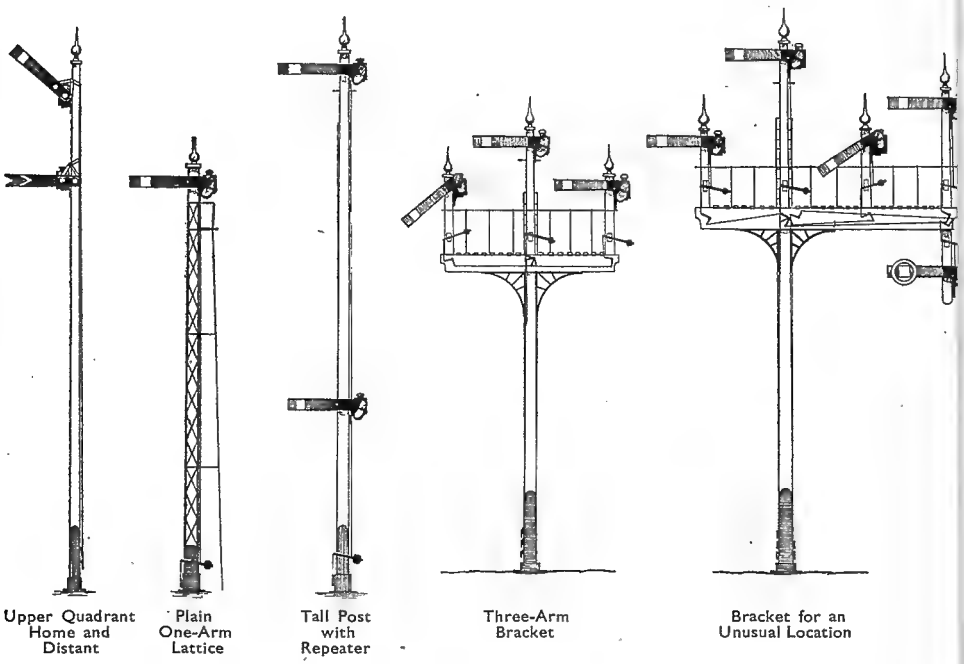



FIG. 104.—Various Types of Signal Locations as may be requisite

same location. The use of gantries is advisable wherever practicable, in order to avoid a resultant layout that appears to be "all signals."

(2) Passing on to the application of the block system to miniature station and terminal sites, it must suffice to say that different locations will require very varied signalling arrangements; but in (H) there is a typical scheme for a four-platform station with one additional siding. Starters are placed at the ends of the two departure platforms—in this instance on a bracket post; a third starter serves the siding for departing trains, and this should actually be interlocked with catchpoints as

indicated. Besides passenger and goods starters, there are on the gantry beyond the station three advanced starters giving permission for trains to enter the main line. The crossover is not fully signalled in the diagram, though advanced starters and homes would partly, or almost entirely, cover the requirements. Beyond the requirements of main line traffic on a model layout, it is advisable to employ either ground signals attached directly to point-levers or to dispense with semaphore indications entirely. A locomotive exit track to the main line from a shed or turntable, as well as tracks immediately leading off main lines to these features, should be controlled by starters. Beyond these locations, and within all yard-limits on a layout, semaphore signals may be dispensed with; in actual practice they are dispensed with unless supplemented by semaphores of the dwarf or ground type.

## SIGNAL TYPES AND STRUCTURES

I have used with the kind consent of my friend Mr. W. J. Bassett-Lowke the drawings from the *Model Railway Handbook* which appear in Fig. 105, and which illustrate the various types of modern British semaphore signals so often described. In addition to these types, there are, of course, also the goods and siding semaphore which bears a ring on its face, and the type having a superimposed letter " S " which indicates that it is a shunting signal, as well as other forms not in such widespread use and often depending on the varied practice of the respective companies. The starting signal is of the plain " home " type, while slotted signals are " repeater arms " which will later be described.

The main modern variations in semaphore signals are to be classified as " plain " and " upper quadrant." In the latter, the arm, instead of falling by gravity to the off position when the levers are operated, raises by mechanical impulse, so that its normal " level " position (signifying " stop ") is automatic in the event of any mechanical failure. There are also " repeater arms," which are placed at a lower position on the post of an unusually high semaphore, and never at a loftier point than 30 feet above the ground, in order that the indication may be seen by drivers when the train has approached so near to the signal that the higher arm is not conveniently seen. These repeaters are possessed of a shorter semaphore, and are operated

by the same movement as that which controls the upper arm. Route indicators are frequently used about stations to show which track or platform the signal refers to, and consist of figures, either fixed or moving, which give this information, and which are placed at some position below the semaphore. Somersault signals, which are indicated in a diagram, are restricted to very few individual systems.

Our task in this chapter is to afford some measure of guidance

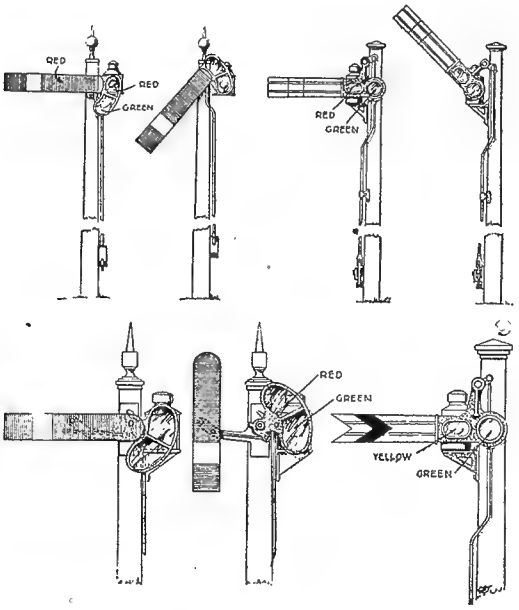



FIG. 105.—Typical British Semaphore Signals
Top left—lower quadrant stop signal; top right—upper quadrant stop signal; bottom left—somersault signal: bottom right—upper quadrant distant signal.

to those who are desirous of constructing their own equipment. In Fig. 106 will be found a series of diagrams depicting various parts which can be more or less readily made for the smaller standards ; it is really doubtful, however, whether in normal days it is worth the time and labour expended on this task when these parts can be had at low cost ready made. The semaphore arm can be cut from thin brass or phosphor bronze sheeting, have its two apertures drilled, and be lined in the off side with red and green cellophane. The pivot bracket is simply a short piece of fine copper tubing soldered on the brass post. The lamps are dummies, and could be had at about a shilling a dozen,

for OO-Gauge. For O-Gauge they can be made from dowelling. Finials are also a commercial feature of trifling cost in white metal, the cap-type being filed up from a brass square with solder on the top. There are two small holes in the semaphore, one of which is for the pivot—a stout pin which is sweated on the front of the arm and bent at the rear to form, for OO-Gauge signals, a dummy back-shade. The second hole takes the extreme end of the operating wire, as shown, the free end being inserted from the front side of the arm. Balance levers, not shown, may be had commercially. In the two drawings of the bracket

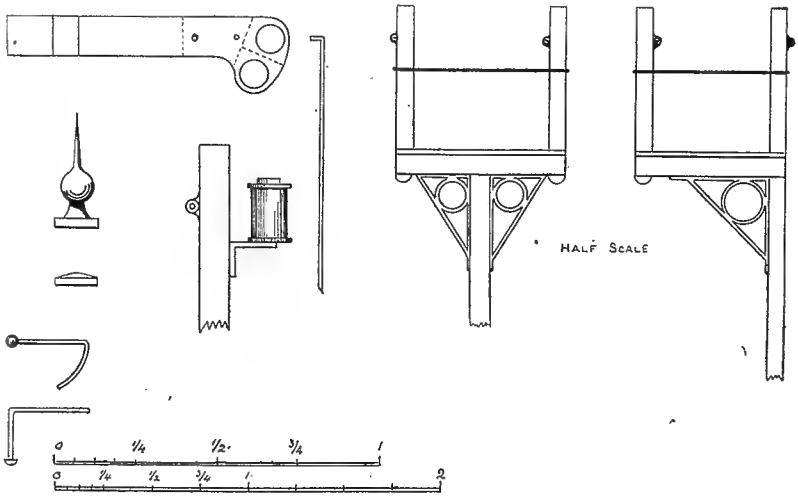



FIG. 106.—Simple Signal Construction for O- and OO-Gauges

posts, which are reproduced only half the size of the components, and which are, like all the posts herein described, formed from brass strip, an idea is afforded of the formation of the under-brackets from wire and solder. These are well worth the amateur's own work, for commercial examples are not of the best. The circular portion of these brackets can be very conveniently made from commercial wire rings of varying sizes.

In a number of small diagrams will be found examples of signals in use—a model upper quadrant home signal with distant below, a plain home single-post type, a tall home signal with a repeater arm below, a three-post bracket type, and a bracket for an unusual location, of a kind which is particularly attractive on a layout where the conditions give rise to its installation. I am

indebted to Mr. O. S. Nock, B.Sc., and to the editor of the *Model Engineer*, for the drawings of the gantries, which should lend real guidance to the builder.

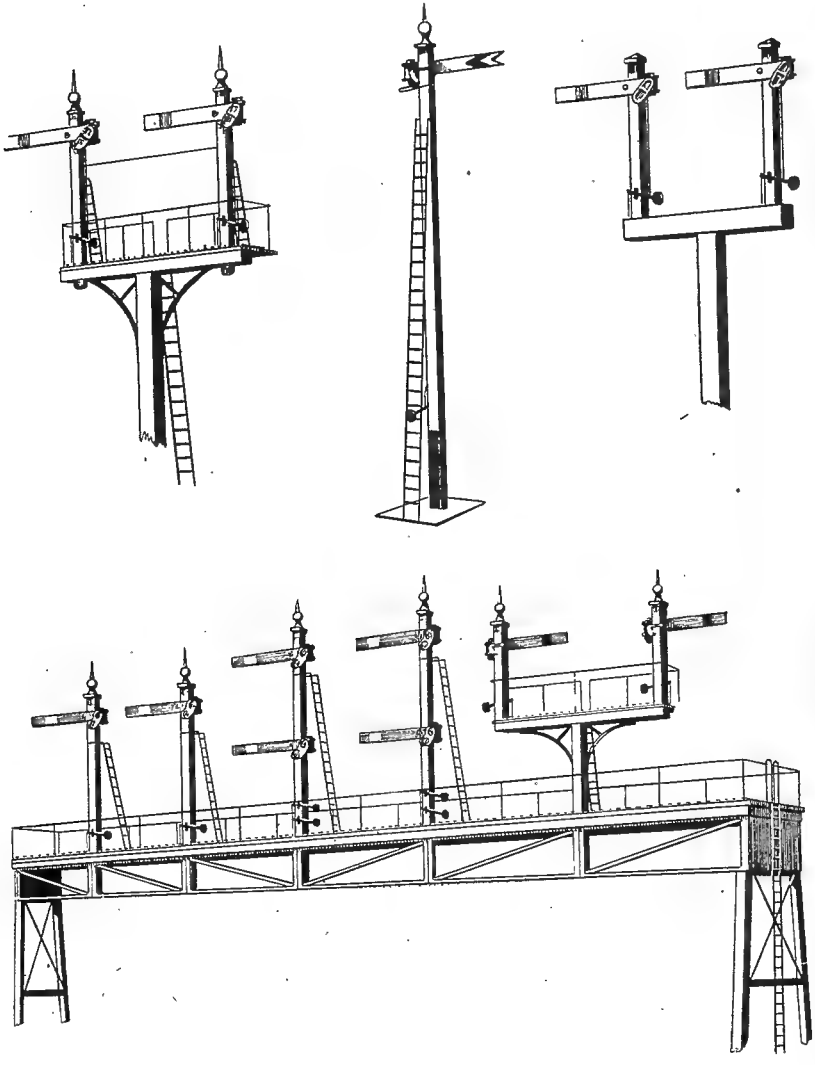


FIG. 107.—Completing the Detailed Fitting of Signals

In various writings I have repeatedly laboured after impressing the need on the beginner to construct all signals with complete fittings and correct detail. The sketches which follow will give

a clear idea of what this detailing amounts to. We have first a double bracket with complete fittings, including gallery, hand-rails, ladders, strut, duckboard and under-brackets. The duck-board is a teaser to make, and it may be worth while to say that G. N. Slater, of Timperley, sells these ready-made. There follows a single post type with details, and by the side of it a bracket type of the kind to be avoided, and such as was unfortunately sold by most manufacturers. The installation of

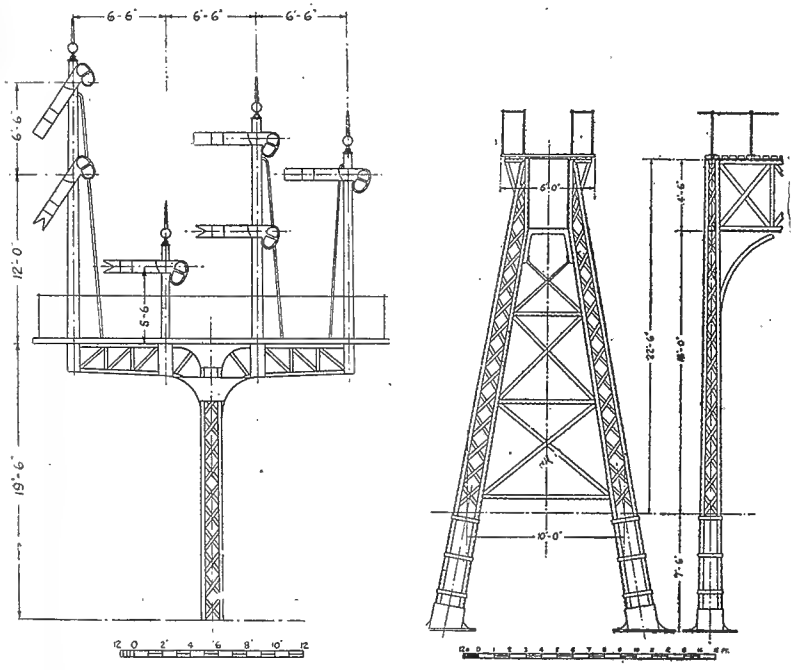



FIG. 108.—Large Bracket Signal and a Gantry End

such beams-with-arms means ruination to any respectable system, and the sketch will show the distinction between what all too often is, and what always ought to be, the latter being revealed in the first sketch. The rough sketch of the gantry is similarly detailed in full. For forming the under-lattice I would recommend, in OO-Gauge, the use of Bassett-Lowke O-Gauge van door frames, sweated to the gallery and posts.

Without all the added details, model signals are the ruination of realism. But there is something which can be done for realism even beyond the detail work already shown,

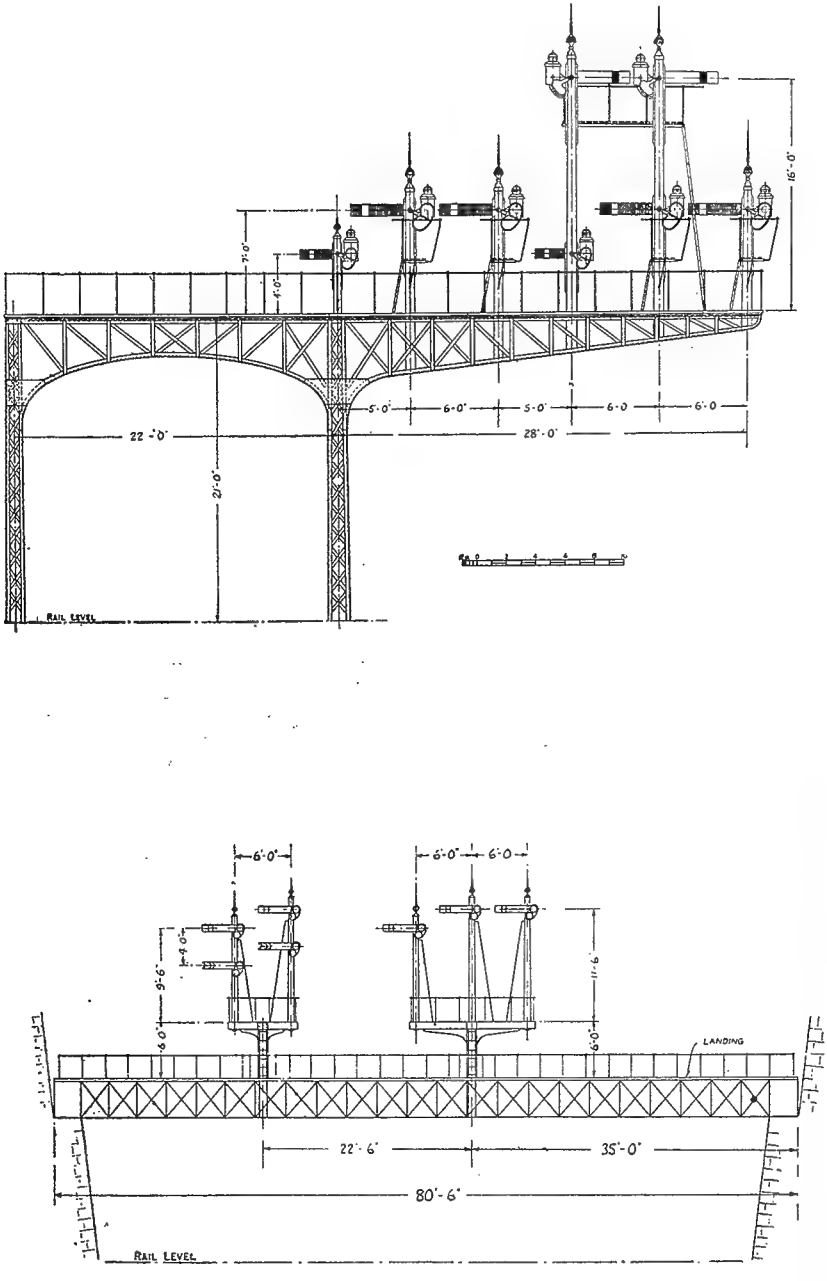



FIG. 109.—Gantry with Projecting Section, and a Bridge Gantry over Retaining Walls

How many signal builders remember the guy-ropes? A sketch and a series of diagrams will give some idea of how guying is done, including the arrangement of guy-wires across double tracks. Another scheme is given in the smaller sketch, where a straining-post is introduced at such a height as to clear traffic. Methods of arranging the ends of the cables near their base are also shown. The first introduces a tiny ship's fitting known as a rigging socket which serves to represent a threaded strainer. This may also be modelled in fuller detail as shown in the next drawing. On the Craigard Railway (O-Gauge) there are some fine signals on which the scale guy-cables serve to convey the current to the semaphore lamps. This is a good scheme, and a method of straining down these wires and attaching them to the underside of the baseboard is indicated in the final drawing.

The height of the posts on a gantry should depend upon the importance of the track governed. Home signals are always placed, where more than one semaphore is fitted on an individual post, at a position above that of distant signals. Height of posts depends upon visibility, though in recent years 60 feet is the extreme limit of height above ground level. As to the fitting of rings on semaphores, there is no inflexible rule that all goods lines should thus be governed.

## MINIATURE THREE-ASPECT COLOUR SIGNALS

Until very recently, it was considered impossible to make working models to scale of correct British light-signals for the smallest gauges. The chief drawback was the fact that pea-lamps of sufficient minuteness could not be obtained, and the smallest ones available rendered the entire structure clumsy and unrealistic. Among new discoveries of recent days must be placed the result of the experiments of the Harrow Miniature Railway Group in this direction.

The model about to be described represents the 3-aspect signal of standard L.M.S. pattern, and the diagrams are dimensioned to the 4-mm. scale. The one exception is that of the length from back to front of the lamp-housing, which should be considerably less than that shown. But the lamps used, otherwise perfect for the purpose, are the smallest obtainable at a reasonable outlay. Mr. F. Reginald Perrin, who has

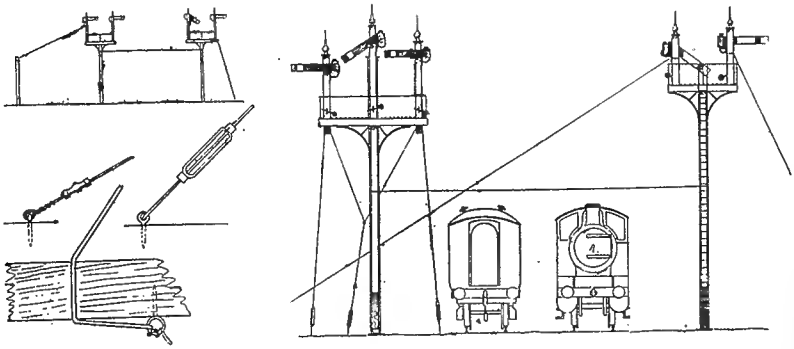


FIG. 110.—Guying Signals

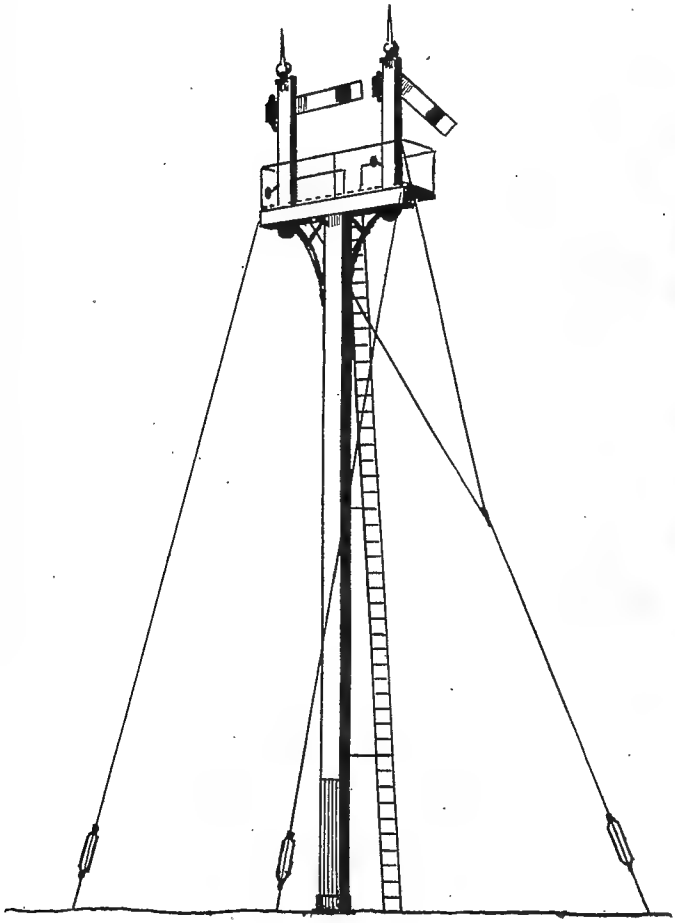
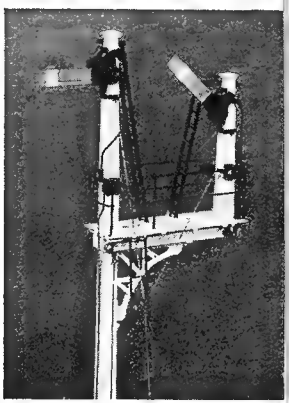


FIG. 111.—A High Bracket properly Guyed



Craigard Signals with Guy Ropes serving as Current Supply to Lamps

provided the details here given, states that the general construction is very straightforward. Special care is needed in smoothing the ends of the posts, in order to avoid chafing of the insulation of the wires. It is vital also to see that the backs of the tiny lamps are painted dull black, so that no light may be deflected through adjacent lenses. The aspect plate, lens hoods, lamp-housing and baseplate are made from nickel sheeting, and the post is 5/64-inch brass tube. The ladder was a stock production in OO-Gauge. The lamps were formerly a feature obtainable

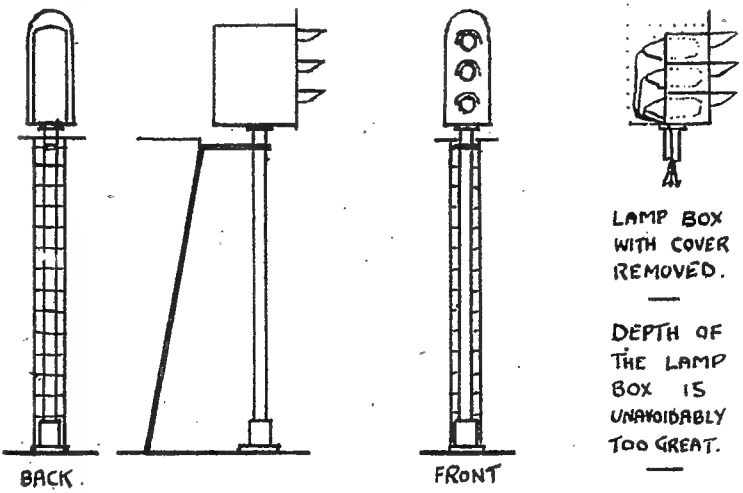
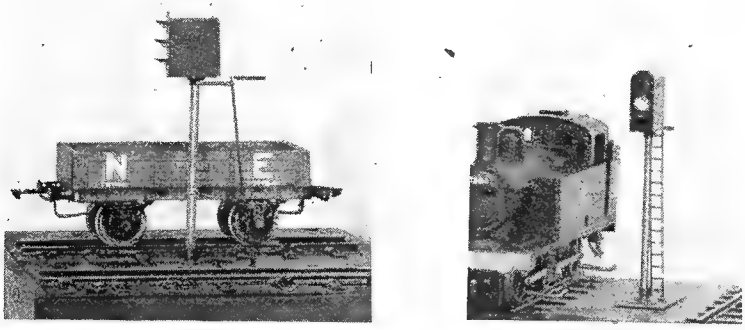



FIG. 112.—4-mm. Scale Model L.M.S. 3-aspect Signal built by R. E. Wilson of the Harrow Miniature Railway Group

at Bonds, and should be once again obtainable when such commodities in general are released.

The constructor of the model in the photos has, I understand, carried out some further experiments with a 2-aspect shunting signal also based on G.R.S. practice. Some idea of the size might be judged from the fact that the lamp-box should actually be 10-mm. in height, 5-mm. in width, and 4-mm. deep. Mr. Perrin states that in his own professional sphere he has handled an auriscope in which a 4-volts lamps measuring no more than 2½-mm. in diameter and a length over its screw cap of 5-mm. overall was employed. These, however, were of Continental make, somewhat expensive, and at that time exceedingly difficult to acquire. It is obvious, however, that after the present hostilities are concluded, there need be no severe

handicap in the way of correct modelling of these signals for the smallest scales.



Mr. Perrin's L.M.S. 3-aspect Signal as Completed

## SIGNAL CABINS OF MODERN DESIGN

In producing a number of OO-Gauge signal cabin designs recently, an aim was made to depart from the ancient timber construction with brickwork chimneystack, and to produce something on more modern lines, introducing concrete as far as possible. This material has the great advantage of modelling extremely well, provided that a good flat concrete-coloured paint is used. I was fortunate in securing a supply of this recently from a manufacturer. There is also considerable advantage in modelling railway buildings after modern standards. The scheme lends itself to interest and variety ; scores of photos of commendable designs appear in current railway periodicals ; and the style also happens to be neater, more striking and novel, and—if this is an advantage—less tedious than the following archaic prototypes. Not the least notable advantage is that the majority of modern types possess no outside stairway, the latter always being a difficulty to the novice and a costly feature to buy.

I resolved that one of my types should be the overtrack cabin for which I gave designs in my first book, the original of which I stumbled upon years ago in a photograph of an Argentine

location on the back of a *Railway Gazette*. I suppose, judging from the photos sent to me and from pictures produced in the modelling magazines, that scores of instances of this design exist on model layouts. The original is a really pretty conception by some railway architect. The model is shown in the first and second photographs. One of its recommendations is that it can be adapted to cover any number of tracks up to four, provided that on one side there is ample space for the ground-floor building. The unfortunate effect of the opaque windows is much more apparent in the pictures than on the original, though certainly the windows should be clear, as they are in

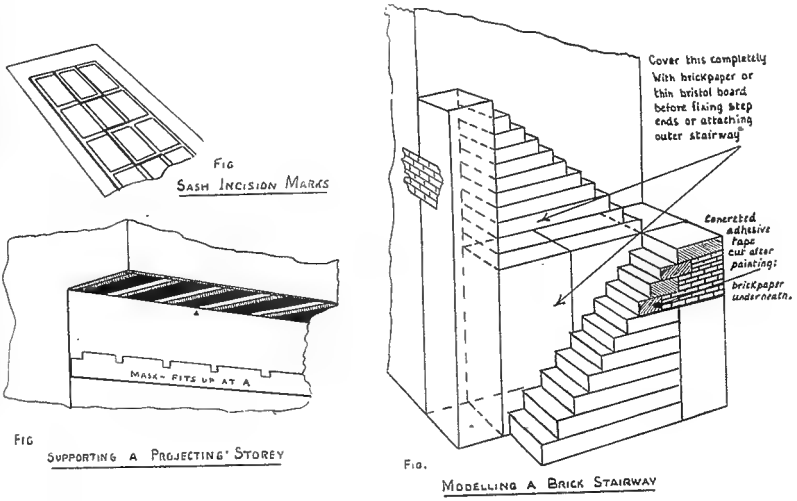

Cover this completely with brickpaper or thin bristol board before fixing step ends or attaching outer stairway
Concreted adhesive tape cut after painting; brickpaper underneath.
MASK FITS UP AT A

FIG. SASH INCISION MARKS

FIG. SUPPORTING A PROJECTING STOREY

FIG. MODELLING A BRICK STAIRWAY

FIG. 113.—Various Details for Signal Cabins

all other instances. For this cabin, it was really a matter of using up some spare Trix windows I had on stock, though there is nothing to beat scribed and painted celluloid for this purpose.

The second cabin, shown in two additional photos, is perhaps something fresh in the history of modelling. The only other existing example of this design, I believe, is an O-Gauge cabin I designed long ago for Mr. Douglas Miller of Broughty Ferry, and which he modelled admirably in that scale. The open window effect also rather takes one's breath away. The roof is covered with green Merco tile paper and ridging, while the Argentine model has a roof formed from pressed tile card as sold by Model Structures Co. of Santa Cruz, Cal. The flat roofs in the second example are effectively finished by first

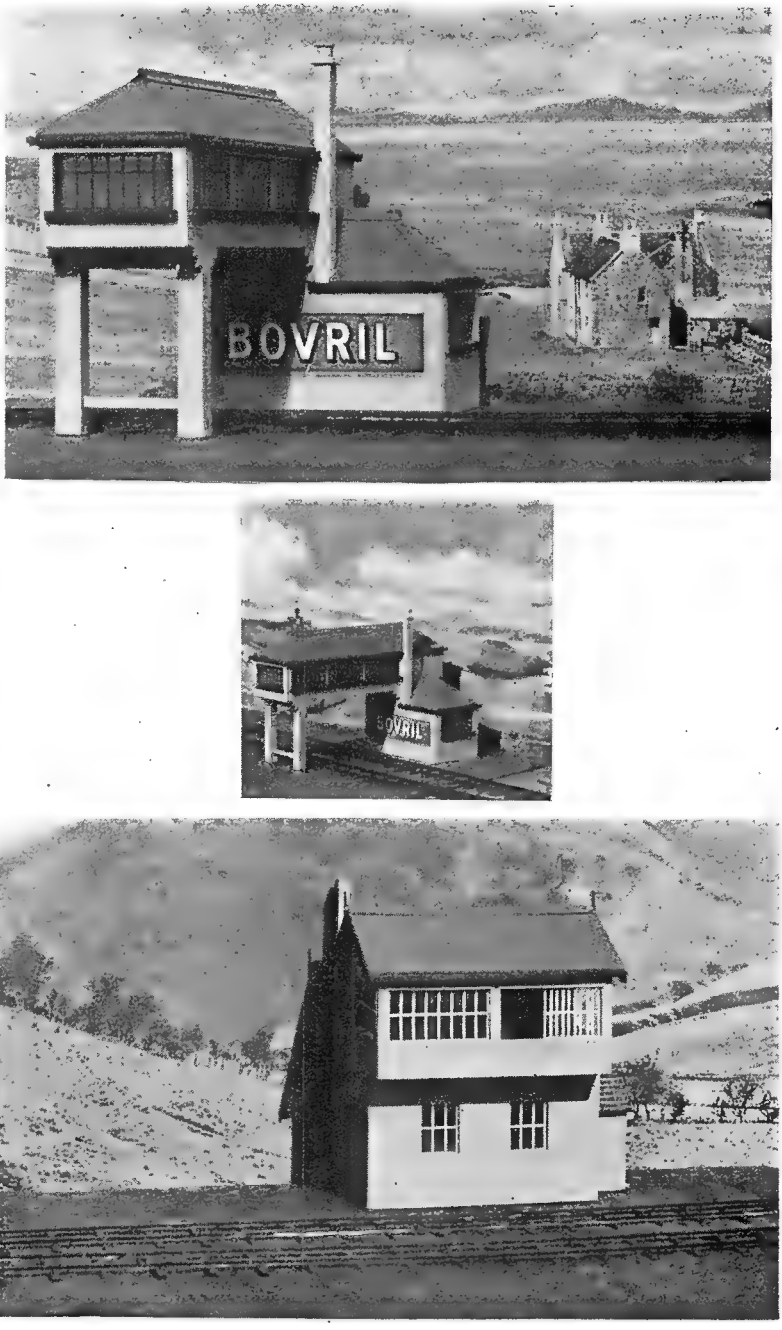
painting the whole roof cement colour, and then sticking on shaped pieces of gummed blackout paper as obtained in rolls. This paper is about four inches wide, and also serves well for certain types of platform covering, to represent asphalt. Window sills in the second model are formed from G. N. Slater's " micro-strip "—a strip inside the window frame on the flat, and a strip outside the frame on the upright, the latter overlapping the former.

Example number 3 is the simplest and maybe most effective. Here, again, the prototype was foreign, and. though I have no notion whatever where it is, it is probably in South Africa. At all events, it conforms perfectly to standard British practice. Pressed tile roofing and ridging are again employed. Here, the open windows are of the sliding and not the hinged type.

For the guidance of those who desire a timber-built structure of up-to-date style, a design is given (Fig. 114) for such a type. The building is a convenient one to model in that it has an inside stairway which either may not be included at all, or, if it is built to be visible through the open door, the stairway itself may take a very simple form of solid structure. In lining out the walls for such an edifice, the method applied to mass-producing wagon sides may be followed, in order to obtain a perfect alignment of the planking.

A few words on certain details. The opening windows, which I have not seen modelled hitherto, are very easily executed. The drawing (Fig. 113) shows how. Everything here depends upon cutting the celluloid so as to show a good portion of the white sash around each open frame ; it does not matter so much about the remaining portion on the full window. Failing this, the window itself will be a failure. The cutting should be done with a razor knife and metal ruler. The cut sashes are then bent to the desired angle by lifting them up against the same ruler pressed hard down on the table. Sliding windows are modelled before being fitted, the rear sash being stuck on the front sash with glue. Keep the glue off the outside of the panes.

An important feature of the cabin with the projecting upper storey is that under the projection there should be, and are in the model, a series of extended joists to support the structure. These are shown in Fig. 113. They were fitted before the floor and roof were in place, and the floor, of course, rests on them, the joists extending the full width of the building. A mask of




The Author's Recent Work on Signal Cabins. Argentine and South African types

thin card, accurately cut to shape, fills the spaces between the joists as a continuation of the lower front wall.

A Further Recent Cabin by the Author

Fig. 113 shows the building of a concrete stairway. The substance of this work is stripwood, pieces of $\frac{1}{2}$-inch by $\frac{1}{2}$-inch for the substructure, and strips of $\frac{1}{2}$-inch by $\frac{1}{8}$-inch for the steps.

The finish of the step-ends is of first importance, for apart from this they will appear impossible. Handrails are of card-strip cut to shape before fitting.

In building signal cabins I begin with the windows, which are made to the style required. If difficulty is met when trying to rub off the white paint, I use a small piece of cardboard in place of a rag, working with the edge. This will take off any paint on the surface without marring the paint in the recesses of the sash-work. Next the walls are made, using a sharp knife kept keen on a table "steel." Walls are always fitted together

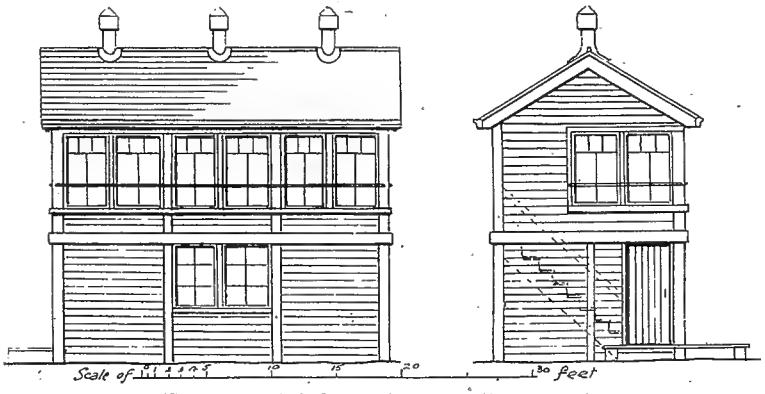
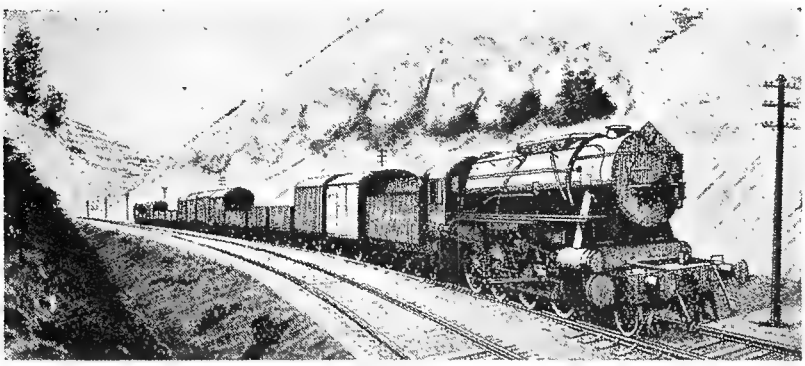



FIG. 114.—Modern Timber-built Example

with parcel strip, which makes a stronger job than anything I know. This useful material indeed serves for the entire structural work, especially the setting of the windows. Brickwork cabins are lined inside with brickwork. Roofs are stuck on with glue, held in place by household pins fitted with pliers, one at each corner. When the glue sets these are removed. A grip of $\frac{1}{8}$ inch is enough for these pins, if it is a grip. To concrete buildings, two coats of paint are given. If quality of card is questionable, I sometimes cover the entire surface with parcel tape, carefully jumping the joints of the edges, not overlapping. The posts on the overtrack cabin are of $\frac{1}{4}$-inch stripwood, glued inside the mask legs at back and front, then bound all around with adhesive tape, being painted afterwards.



## CONCERNING SCALE PROPORTIONS

A CORRESPONDENT in the columns of the *Model Railway News* recently wrote a very interesting letter on the subject of the scale capacity of a given space for modelling. The following is a quotation from his letter.

"It has been a desire of mine, for many years, to construct a model of Newcastle Central Station to include the River Tyne and its bridges. I doubt if a more interesting prototype can be found in the country. Let us briefly consider the possibilities. First of all, we have both electric third-rail and steam traction on one of the largest railway crossings in the world. Then we have the river, with the possibility of ship modelling. The river is spanned by the Tyne Bridge, the Swing Bridge, the High Level Bridge, the King Edward Bridge and the Scotswood Bridge, each being a different type. Lastly, we have historic buildings mingled with modern ones, all within the compass of the model. Surely such a project would be a model maker's dream ; but try to scale it down and, even in 4-mm. scale, one would still need a public hall to house it.

"The dream is recalled when the possibilities of 2-mm. scale are considered, and a spare room of 20 feet by 10 feet would be 1,000 yards by 500 yards. Such a model as I envisage could still not be faithfully reproduced within such a compass, but, by

judicious arrangement, a very representative landscape could be built."

It comes as something of a surprise to discover that it would require a space of 40 feet by 20 feet to accommodate even a cramped and modified model of the Newcastle Bridges area in OO-Gauge, or that a 4-mm. scale model of Folkestone Junction would require a space 40 feet long. The fact is that the majority of amateurs have a very vague notion of scale proportions in

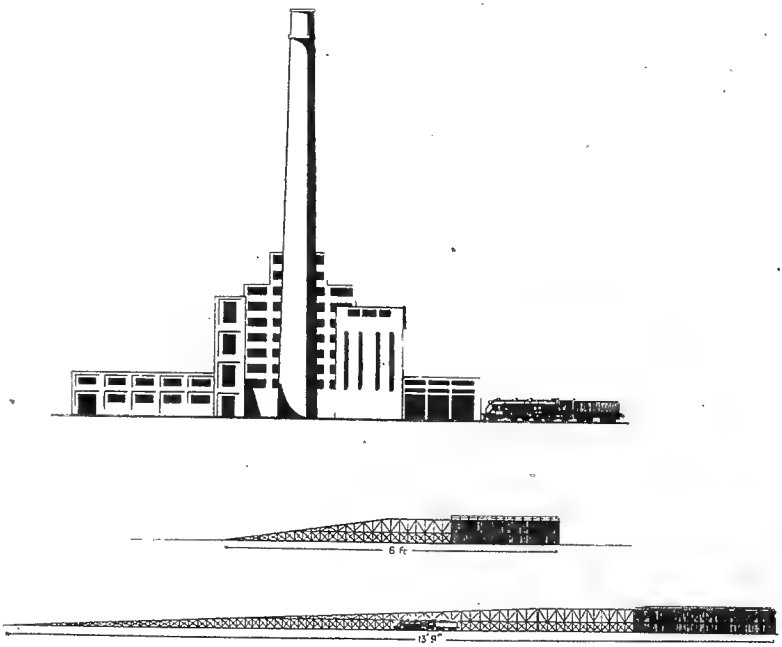



FIG. 115.—Some Interesting Scale Comparisons

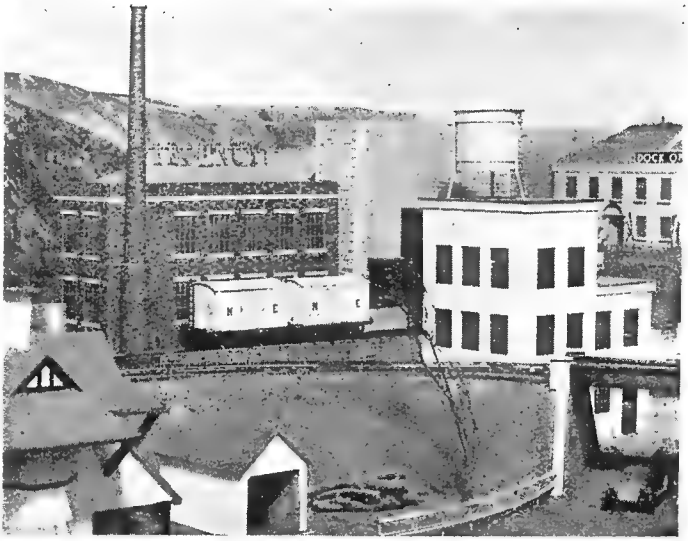
general ; yet all convincing scenic work depends very strongly upon this quality which may be termed "scale sense." One has only to glance at the attempts—sometimes quite creditable —of certain beginners in order to realise this.

Some of the common scale distortions which strike the practised eye at once are to be seen in relation to the sleeperage and general construction of track, the design of telegraph poles and trackside fences, the disproportionate dimensions of signals, the use of pedestrian figures of people who would be fully eight feet in stature, the strange foible of most American modellers in making their conductor rail almost like a wayside fence, a

6-foot way far too wide, and the doors of goods sheds barely wide enough for a common vehicle to squeeze through.

There is nothing so deceptive as space. The writer has knowledge of only one model of a ship in a railway dock that has not looked absurdly out of scale, mainly because builders insist upon modelling huge vessels to a smaller scale in order to get them into their layout. Ships, in fact, are a very frequent cause for stumbling, and thereby often ruin an otherwise attractive scheme. A model of the *Queen Mary* for OO-Gauge scale would be fully 12 feet in length, and to attempt the same ship in a different scale for the same standard of layout is ruinous to all appearances. The model of a coal mine—if it is to be anything like a complete one—should never be attempted in any gauge unless the prototype followed is a very small private example such as abound in Lanarkshire. The only way to get such a model even into a 4-mm.-scale layout is to design the bulk of the buildings on the back screen in perspective, and to bring out a few of the loading facilities into full relief by the track side. For a really large mine will cover an area as large as that of a terminus station. Factory chimneys are another snare. If the diagram in Fig. 115 is consulted it will be seen that a quite normally high chimney might for OO-Gauge be about 36 inches high; and this is why such factories must of necessity be kept small unless they are really to be faithfully modelled. In the same figure will be found two other drawings, the lower of which is a faithful replica of the old coaling stage at Altoona on the Pennsylvania Railroad. The lineal space required for this model in 4-mm. scale would be 13 feet 9 inches, with at least another 4 feet or so for its approach. This means that, unless it is possible to modify the model without distorting the appearance of what it claims to be, it is impossible to model it at all. The upper drawing, however, shows how, in an instance of this kind, something of this nature can be done; and it is possible to get at least a suggestive replica in a space of 6 feet instead of 13 feet 9 inches.

It is because of this deceptiveness that I have already recommended the modelling of light railways and suburban lines for restricted areas. There is much more scope for consistency when this is done, and numerous otherwise bulky features such as turntables can be totally eliminated if only tank engines are in use. A very common mark of inexperience in scenic working and in railway modelling alike is seen when



Two Interesting Corners on the old and new West Midland Lines

the builder creates a huge passenger terminal with ten or twelve platforms, to be served by a main line whose total length is no more than, say, 50 feet. Large stations should be avoided like a plague unless the instance modelled is the only station on a very full-tracked system, whereon several trains will require to wait for others. It is far better to adopt the small country station as an original, and if needs be to have several of these.

Discussing scenic proportion also reminds us of the growing American idea of reducing the scale of buildings as the landscape of a layout recedes into the background ; sometimes, indeed, a railroad of a smaller scale is introduced. My own conviction regarding this practice is that it is excellent on a very large and ambitious system, such as that exhibited at the World's Fair in Chicago. But for the average layout the scheme will lead to scenic confusion rather than to realism.

The writer has never been an advocate of small layouts as such. His motto would be : " The larger the area of the layout and the smaller the scale of the models, the better." The foregoing remarks apply only to those workers who are restricted perforce to a small terrain. Very often, one can get a fine, comprehensive layout in a normal space by adopting a smaller scale, and this is, of course, the actual reason for the existence of these scales.

## DOORWAYS, CORNERS AND ACCESS SPACE

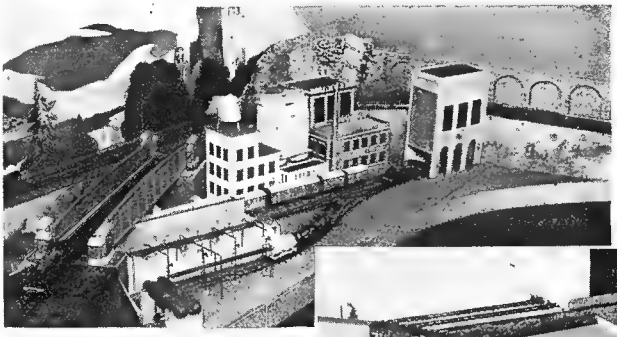
Doorways and corners, with the problems they present for the railway layout designer, may be set apart as special items for consideration. They are unlike any other situations relating to location which can occur on real railways, and therefore require special treatment.

No one has yet invented any happy means of dispensing with either, and the invariable situation presenting itself to the indoor worker is that these snags have to be surmounted in the most expeditious manner possible.

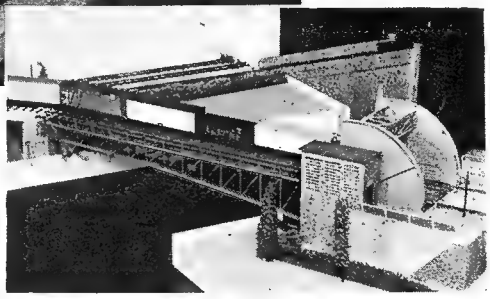
A common mistake that the beginner makes in attempting to surmount the difficulty of " getting around a corner " is to think it a wise idea to push back the curve as far as possible into the recess by reducing its radius. This, of course, is fatal to the best interests of the layout. It is much better practice to bring out the curves as far forward as possible, to give them

generous radii, and to put various features of usefulness or scenic meaning behind the curves

There are three aims to keep in mind when corners are



Oil Storage Depot



Lift Bridge at Doorway

A Corner Factory

Three More Corners on the old W.M.R.

being dealt with. The first is efficiency for the service ; the second is the ingenious utilisation of every bit of corner space for some deliberate purpose ; the third is picturesqueness. The fact that there is a corner, in the first place, ought not to have

the slightest detrimental effect upon the running of traffic. Nor ought it, secondly, to result in the sacrifice of precious square inches to no purpose, where every one of these means so much, as on an indoor site. In the third place, corners can be employed to lend a real support to the general scenic finish of the layout—especially when other kinds of space can rarely be claimed for this purpose entirely.

Sometimes nothing more is possible, of course, than to form imitation cliff-work behind the curve of the railway at a corner, and this may often be done very effectively. Gardener's cork can be had in convenient sizes, either flat or curved, at a very low cost, and can be easily arranged and tinted with colours, so as to suggest this feature. Sometimes, in fact, the cork material described has such rare qualities of imitating the very strata and formations of rock that it lends itself peculiarly to this use. It should be arranged, if possible, with the top edge against the skyline so serrated as to be striking in realism, and the pieces should be lightly screwed to plywood sheets to fit across the angle. Generally, one sheet will serve the whole purpose. Another very useful material, hitherto rarely experimented with for this function, is plaster-bandage. This medical material is a form of lint impregnated with plaster of paris, which, when moistened, takes any given shape and sets like rock in a very brief time. It is specially useful for forming cuttings, rock-work, mountains, and even other less-likely features in miniature railway and scenic work. Failing everything else, this method of occupying an otherwise useless corner cavity is recommended. Fig. 116, (A) and (D) shows this kind of procedure. It is not merely a matter of forming rocks and leaving it at that. The rock work should blend with adjoining scenery and with the formation of the railway. In (A) there is a river running along the front of the tracks and passing off under a bridge, and this has an inclined bank at the rear rising to the high level, and affording a very realistic presentation of a line skirting a river bank, as is so often seen. In (D) the method is different. Here there is a suburban loop, suitable to a light railway worked by motor coaches or other suitable equipment, which rises above the main line and takes a corner tunnel. In order to perfect the appearance of the plaster-lint some degree of artistic qualification is requisite—the surface dries white and needs to be painted convincingly. Moreover, it dries somewhat quickly, and the understructure of crushed paper or shavings must be ready.

A plywood back board for the two sides, shaped irregularly along the top, will form a good foundation, and the lint should be secured with tacks to the back of this. Something may be done by way of getting this finished and then delaying the hard-setting of the material if sections of it are damped with a sponge gradually. But experiment will be necessary to do the work

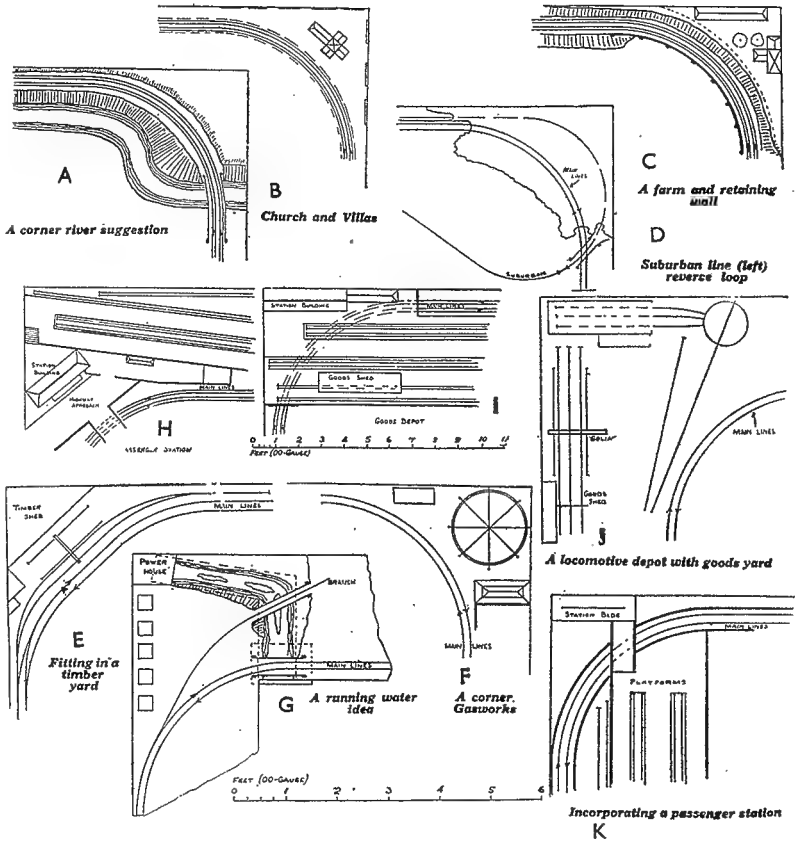



FIG. 116.—Practical Schemes for Utilizing Corners

successfully. What to do with the river is another question, and of course, one end of it will require to be continued some distance along the baseboard of the layout. The tunnel idea, with its loop track, gives a good opportunity of introducing attractive bridge work.

Another method is to introduce some scenic architectural or industrial feature. In Fig. 116 at (B) and (C) and at (E)

and (F), this is illustrated. In (B), there is no substructure whatever at the corner, but the back scenery would be run right in and the corner itself fenced off by the tracks for a green. In the middle of this, diagonally, there might be set a church, and around the two corner walls might be fixed the perspective " flats " of houses suggesting a housing scheme. In (C) the same method is applied to a farm with fence and gate, including stacks of hay and stabling. Here there is a rise from the railway to a high level plateau. In (E) we have a timber yard, and in (F) we have a gasworks. It is no part of our task here to describe these various buildings, but merely to indicate their ground-plans and their relationship to a layout, and to the tracks.

Many other ideas may occur to the reader himself. A scenic use is the right thing to choose when all other uses seem to fail where the vacant corner is concerned.

A most useful and ingenious scheme was suggested to the writer some time ago by Mr. Kenneth McAldowie of the Edinburgh M.E. Club. The inspiration of the idea was the visit of a friend to this gentleman's layout for the purpose of taking cinema films, when it was felt that as much movement as possible was desirable. It was not found difficult to lift a little of the baseboard—the corner joints are a good place to choose—enough to secure a right-angular cavity. To fit into this cavity a zinc trough was made, with sides to come above the baseboard edge, and, of course, watertight. This was filled with concrete or plaster of paris to represent rocks and the banks of the shore. Small rocks were set in this material. At the lower end, under the trough, which discharges into it, there was fixed a dripping-tin of correct size, and at the upper end of the waterway a power station was built in the corner. A pipe and a small motor-pump connected the lower and upper ends, the pump being in the power house. In the plan Fig. 116 (G) there is a convincing arrangement of bridges which serve both to give a finishing touch to the appearance of the feature and to disguise the location of the lower tray. The latter should protrude just far enough to receive without spilling or splashing the discharging water. To secure a constant level in the lower tray, the pipe could be taken from a smaller tin within the tray, having its edges $\frac{1}{8}$ inch lower than the latter, into which the contents of the larger tray could overflow. The water from the river, would, of course, discharge into the larger vessel. The water, filling the larger tray, overflowing into the smaller one, runs out through the pipe and is

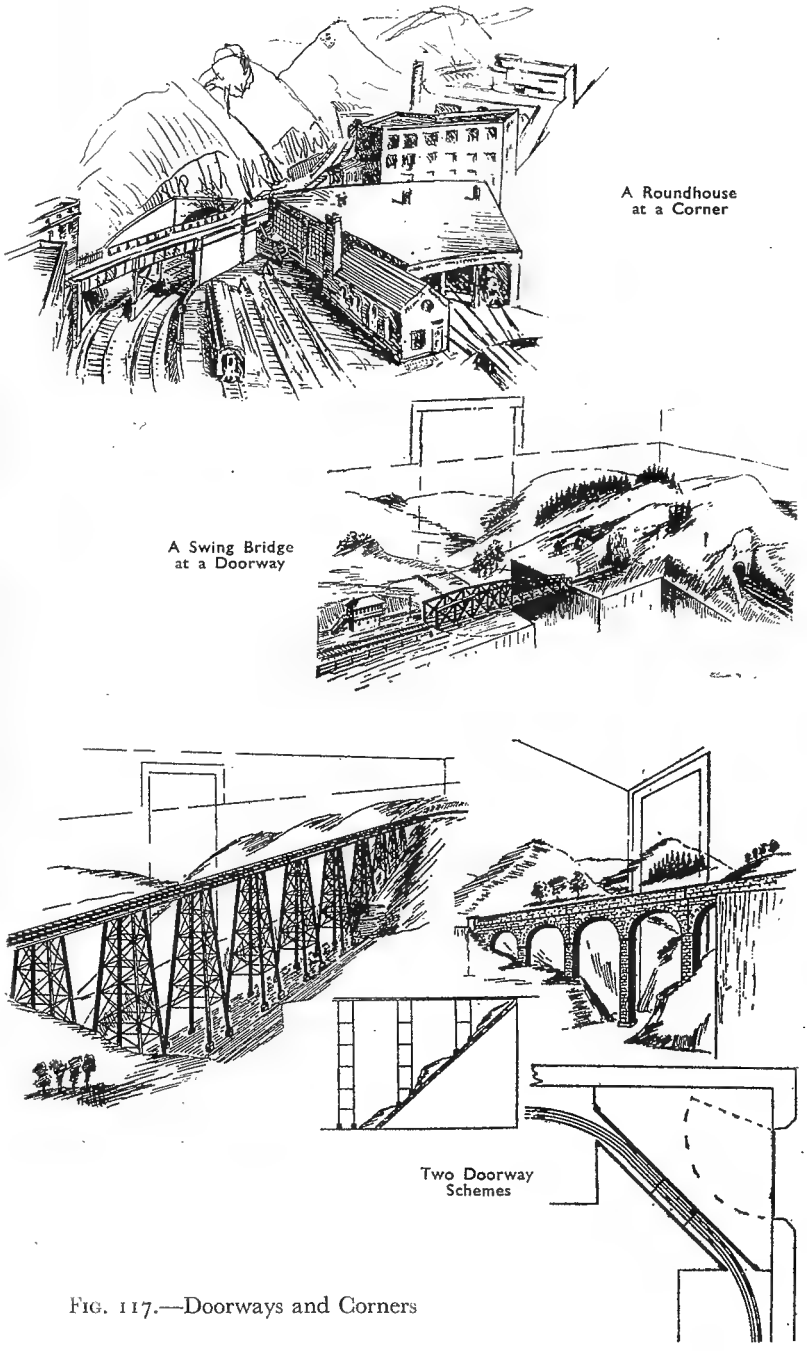



FIG. 117.—Doorways and Corners

pumped up at the head of the stream, where it discharges into the river. The scheme seems to be a good one and fully practicable, and might be applied to other than a corner feature. But it would make an effective set piece in such a location.

We return to Fig. 116 which at (H), (I), (J) and (K) illustrates certain actual features of a layout occupying corners. It may be said that each one of these features has been tried out and already exists on the layout of Air Commodore T. A. Warne-Brown, D.S.C. There are one or two photographs also which depict most, if not all, of these instances. It will be seen that at each of the four corners of this portable layout the best possible use has been made of the space. In (H) we have a terminus station with its track running right into the recess, the main line skirting the outer front of the site and being spanned by a highway bridge leading to the station building. In (I) we have a goods yard adjoining the other terminus of the system, under which the main lines pass by way of a tunnel—a quite common arrangement. (J) shows a locomotive depot and gantry-crane of a goods yard at another corner. Here the main tracks are at the front, and on practically the same level. At (K) the main lines pass through a cutting on the low level and the platform ends of a station abut upon this cutting, which is spanned by a wide footbridge carrying part of the station concourse and leading to the building, which is right in the recess.

Having dealt with the difficulty of corners we can now turn our attention to the entrances to the room. The doorway of a room presents the most difficult of all the problems which attach to the site of a miniature railway. This is partly due, of course, to the fact that there is no fixed rule as to where the door will occur. It may be in the centre of the narrower side of the room ; it may be in the corner on either side, or it may be in the middle of the longer side wall. It may be hung so as to open outwards or inwards, and this itself is an important matter. Without question, the most suitable location is in one of the corners, for this avoids any breaking into the continuation of a side wall. But on the other hand, though the corner is to be preferred from this standpoint, such a corner is itself very awkward to bridge over—much more so than a gap in the centre of a wall.

There are four things to keep in mind when deciding upon what to do about a doorway. First, there should be absolute convenience of entry and exit, not only for operators, but for

less adept visitors. Stooping is very distasteful to middle-aged and elderly people generally, the result being often very much more serious for the owner than the mere discomfort of the entrant. Many elegantly constructed bridges have suffered destruction by reason of the tornado of a careless elbow, and many a good suit of clothes has been terribly ripped between the shoulders by an ill-judged stoop. This all suggests the need of some kind of lift or swing-bridge, but if this is installed, there is grave danger of its being inadvertently left open, with disastrous results to some favourite locomotive. Which fact, again, points to the need of some form of automatic control.

Meanwhile, we will pass on to the second factor to be kept in mind—that of satisfactory track-continuation at a doorway. If any kind of movable bridge-section is provided, it will be necessary to make sure that proper electrical connections are made for current supply, and that the alignment of the running rails is so arranged as to give perfect and infallible movement for the trains. Thirdly, there is the question of the movement of the door itself. If this opens outwards, there being no continuation of the railway through the doorway itself, little trouble will arise. But if it is to open inwards the need of providing clearance in the manner indicated will become absolutely essential. All things considered, the best course is to remove the door bodily and store it away, but this gives greatly increased scope for dust. Lastly, there is the scenic factor. This hardly comes within our immediate purview, yet it must be borne in mind in arranging the layout at a doorway that provision must be made to continue the scenery behind the cavity in the baseboard.

On the whole it is not a good practice to arrange for a section of the baseboard to lift out bodily for door-passage. Such a section is generally unduly large and bulky and involves the breakage of too many tracks, with the resultant need of seeing that they all align accurately when the section is replaced for operation. Furthermore, the section itself will require, when not in place, to be stored. It is not convenient to let it lie on the top of some other scenic or operating feature, and this involves the forming of some kind of shelf, high above or underneath the baseboard on which to store it. Such movements as those entailed are highly undesirable, unrailway-like and tedious. Another scheme, much better, and not too difficult to arrange, is to design the layout in such a manner

as to avoid all forms of restriction at (A) which would make this necessary, and these are not entirely undesirable layouts. It must be admitted that such a procedure as this greatly tends to limit the scope of design—there is not much choice as to the style of the layout if the door has to be left completely unimpeded. Many extremely valuable possibilities will be sacrificed.

An original scheme by the writer will be found in Fig. 118 at (B), which shows the plan, while in Fig. 117 will be found a perspective sketch which makes the scheme clearer. In the

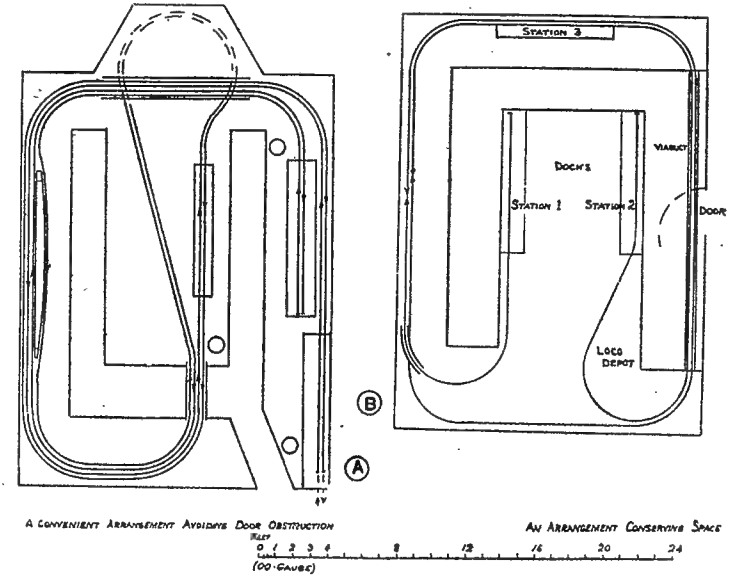



FIG. 118.—Planning Layouts for Convenience at Doors

latter, of course, the full timbering of the piers of the viaduct is not included, the amount of work lavished upon the structure by the builder being a matter for his own decision. It is not an extremely difficult structure to make. The upright timbers could consist of dowelling, braced together with cage-wire, soldered diagonally to give adequate strength. The two bents immediately in front of the door, which occurs about centrally, let us say, in the wall, are arranged to be removable by lifting out, and are permanently attached to a moving section of the deck. The formation of the end inclines is shown in section, and is very straightforward, these being of sloped wood, covered with either plastic material or with tinted cloth or lint. The

scenic background, consisting of very deep railway posters of the larger dimension is continued right down to the floor. One advantage of this scheme is that the viaduct can be set well back against the wall, thus clearing the centre of the room for a very wide " peninsular " baseboard, or even for two. A further advantage is that a striking and rarely applicable actual railway feature can be modelled. Some very successful attempts have been made at building such a trestle viaduct in the open ; and a few have been erected which represented splendid work indoors ; but such are not often seen.

Fig. 117 shows another suggestion, not entirely new and the sketch and the plan below will be almost self-explanatory. Here, again, the central pier, together with a couple of the arches, lifts out, leaving a clear footway. The scenery again comes down to floor-level, the doorway being in the corner of the room. The bridge is built of fretwood, strongly glued, and the stone-work can be simulated in Merco old stone building paper. Several types of lift and swing-bridges will serve admirably for location at such a place. The perspective sketch in Fig. 117 depicts a swing-bridge. It will be seen that the swing is so arranged as to clear absolutely, when open to the doorway, all movements of incomers. It lies snugly alongside the edge of the gap. A lifting bridge gives equally fine clearance. The sketches give some notions of how to continue the make-up of the scenic work behind and about the site.

A glance at the latter sketch is enough to cause any experienced railway modeller to shudder, the danger of trains crashing over the precipice being so obvious. It is, however, a very simple matter to provide against such an unhappy contingency as this. The most straightforward scheme is that of arranging for the current supply of the bridge and of running sections within six feet of either side to be in one circuit, broken only when the bridge is raised, by the lifting of contacts on the falling or closing end. The circuit from the main-line conductor is carried to the moving section of the bridge, and is broken at the bridge contact already mentioned. When the bridge is open against rail-traffic, therefore, the main supply through the bridge is cut out from the bridge itself and from the two six-feet approach sections.

Related to doors and corners, and scarcely warranting a section to themselves, are access spaces—those apertures in the baseboard or formation of the layout which are provided for

operational purposes and require to accommodate the person in charge whether he be manipulating the railway or carrying out repair work. The more orthodox of these spaces will take the form of the vacant place in the centre, if the scheme be that of a broad shelf around a room ; but it does not follow that this will always be so. It may be that access spaces will be sprinkled in an apparently hap-hazard way wherever there is the need of regular inspection and the occurrence of a vacant patch in the layout—especially if the newer method of using up almost all the area for the layout is adopted. Sometimes such a space will require to be covered unless in use, and this

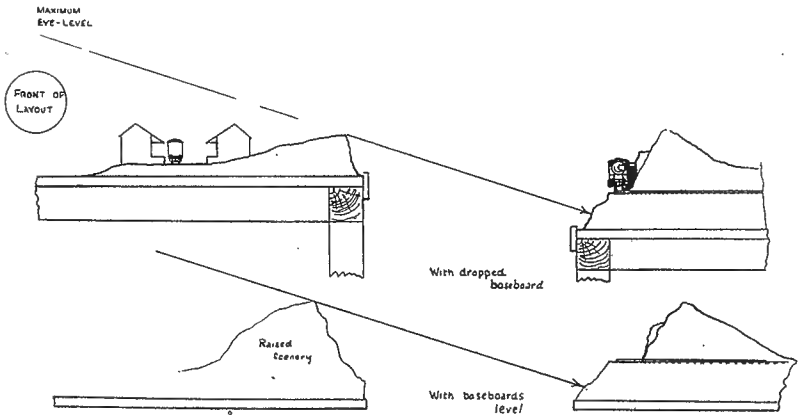



FIG. 119.—Disguising Access Spaces

can easily be arranged by fitting a lifting board of stout plywood on which there is represented a field or other open scene. A better scheme still is to arrange these somewhat erratically occurring access spaces so that, from the standpoint of the spectator, they are invisible, and this task is much simpler than it sounds. In Fig. 119 will be seen a suggestion as to the carrying out of this illusion, which is accomplished either by the sinking of the rear side of the aperture or the raising of the scenery on the near side. By adopting this idea, the need of having incongruous gaps in the scenery is eliminated. The variation in height will not necessarily be great ; much depends, of course, upon the general height of the baseboard.

## RAILWAY FENCING

Of the various types of fencing seen around railway premises and alongside the main line, the common form of permanent way fence is best known. This consists of wooden posts driven firmly into the ground with four or five bars either nailed to

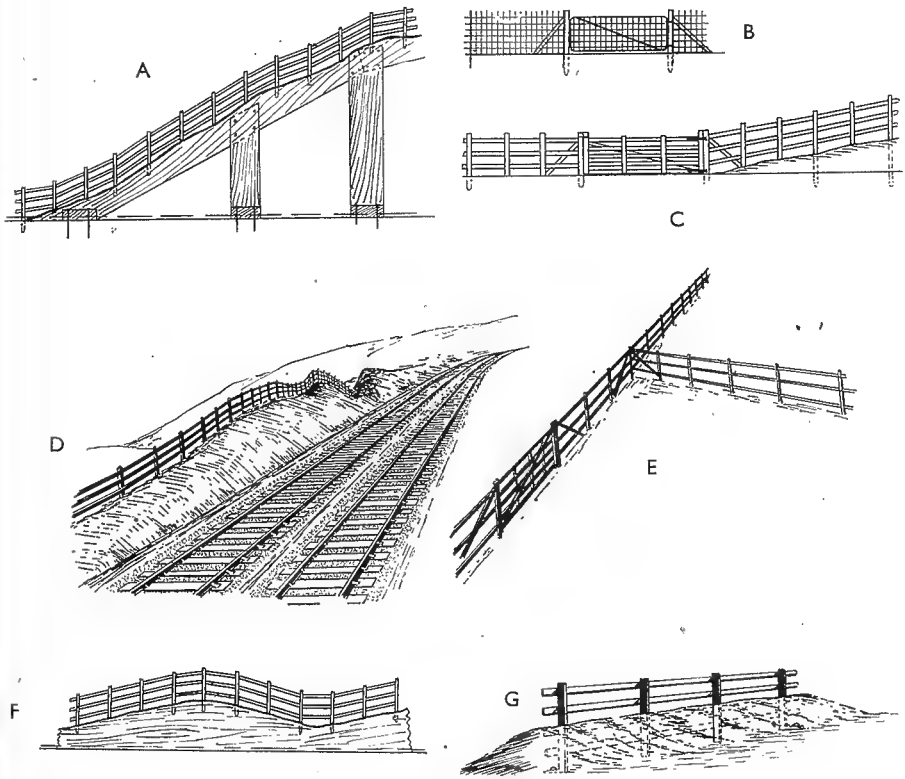



FIG. 120.—Railway Fencing

or set into the posts. Most copies of this fencing err on the side of spacing the posts too far apart ; they are actually quite close together, six feet being a very fair average. Any departure from this spacing somehow seems entirely to alter the character of the fence. Diagrams of this type are given in Fig. 120 (A), (C), (D) and (F), the second-named being representative of level work, together with an example of a gate to match. Galvanised steel wire is sometimes substituted for the horizontals. At all field

corners and at various other points, straining posts are provided, with a diagonal beam running into the ground in a direction opposed to the pull of the wire or the weight of the fencing. It is noteworthy also that road-bridges over and under a line of railway have their approaches fenced in the same manner. On a galvanised wire fence, the type of gate used is often of the wrought-iron pipe construction with strained wire against it. These gates are very easily and daintily modelled from wire with a touch or two of solder, and the type is shown, together with an ornamental fence constructed from window screening, in Fig. 120 (B).

For OO-Gauge layouts it is possible, failing all else, to utilise the old form of standard O-Gauge fencing of the barred type, which was made in metal and provided with drilled bases. The structure has the advantage of being strong and stable, and is good for edging where there is a lot of manual movement. The method is to fix the fence as for O-Gauge, and then to provide a bank or filling of plastic material (see Fig. G) to cover all but two of the bars.

Various forms of hedging are also often used in place of a wooden structure; and in localities where the material is plentiful, a masonry wall is often used. There is little difficulty in modelling this type, for special building papers may be had for the purpose.

An important item concerning fence-modelling is the question of how to set in the posts on ground which happens to be off the level, or undulating. The form shown in Fig. 120 (D) is typical of miles of British permanent way, where the road-bed has been levelled up while cutting through ground which takes all manner of surface contortions. Sometimes, also, the tracks run straight through a hill, by way of a deep and precipitous cutting; and here there must be the usual fence provided for the right of way. The best method of modelling this kind of situation is by the methods shown in Fig. 121. A plank is roughly cut with a keyhole-saw or fret-saw to the required shape along one edge only. If the rise of the bank is steep, this plank is supported as indicated in Fig. 121. Then, after the surfacing of the hill has been placed in position, the fencing-posts are driven into small holes along this uneven edge. Note carefully that there is no need to sink every post into the "earth." At all points where the horizontals are parallel and straight they are carried for any distance—say the length of

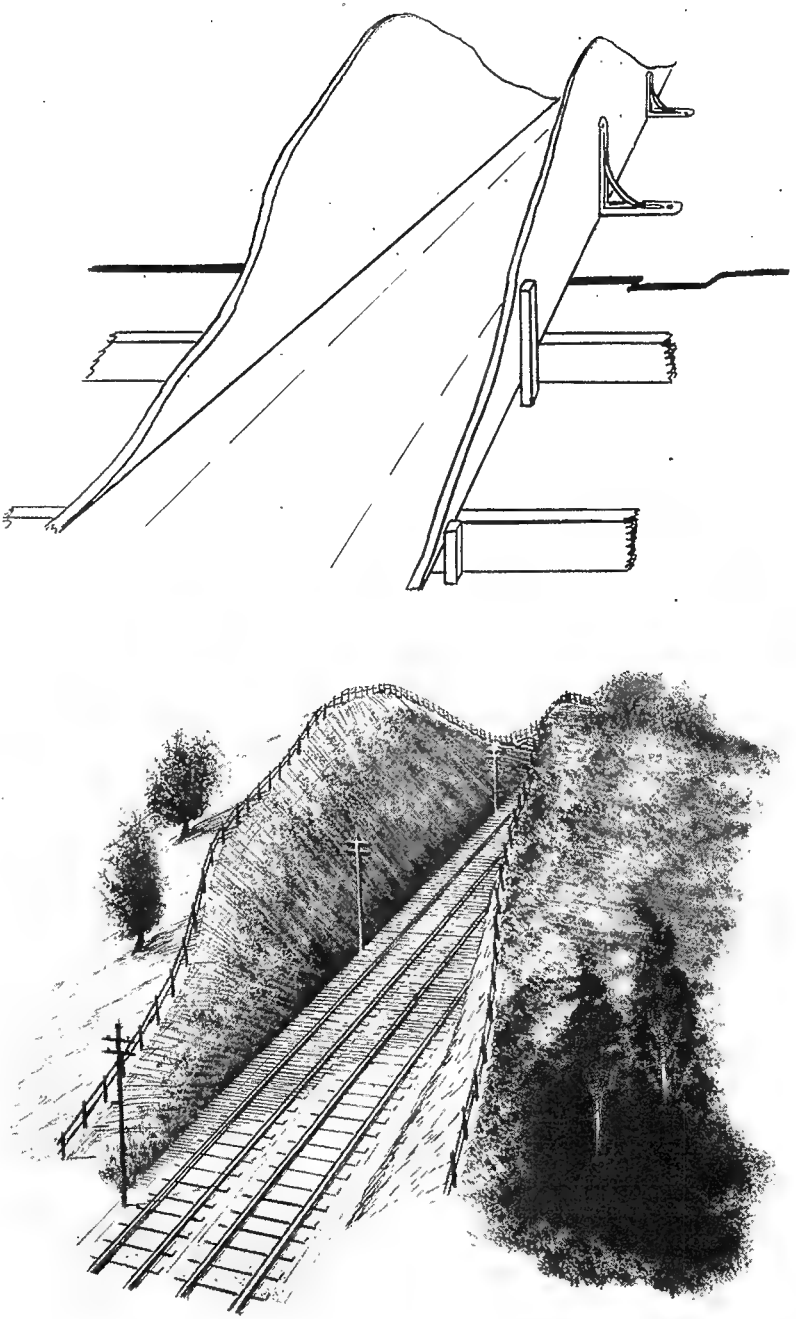


FIG. 121.—Forming a Cutting with Fenced Edges

four posts—without any intermediary sunk posts. But at every place where the level of the horizontals changes, a fresh post must be inserted. This simplifies also the construction of the fence, and the diagrams make the method clear. This method can be adopted whether the baseboard takes the flat table-top form, or the more modern form of having scenery built straight up from the cross beams. The best material to use for such fencing as this is thin metal strip, the fence being soldered up after the posts are driven in, and the unsunk posts afterwards added. The spacing of the horizontals is done by means of short strips of wood of a correct thickness, inserted above a beam before the next one above it is soldered.

Fencing has been badly neglected by the manufacturers in all scales, but one reason for this neglect lies in the fact that the contour of a layout can never be foretold, and on this contour there depends the entire structure of the fencing.

A point to be especially regarded in this work is the providing of enough rows of horizontals. There are never fewer than three of these, and more usually there are four or five. The painting of such fences is a matter of taste within certain limits. nothing has a better appearance than white ; but it should be borne in mind that white fencing is very uncommon. A more generally suitable colour is dark brown, though the gates in trackside fencing may often be of a white colour. In painting the ornamental fencing of Fig. 120 (B), care should be taken to shake or blow the work as the painting proceeds, in order that the paint may not web over the small apertures in the material, This form of barrier, around houses or factories, may often be white or aluminium.

## TREES AND AFFORESTATION

I am not aware of the method employed in the making of the new range of miniature trees put out by G. E. Mellor, but an examination of what can be discovered on the surface suggests that a fine calibre of steel wool forms a part of the scheme. This fact, along with further considerations, suggests a manner of construction which it may be worth while to discuss. I have collated a number of pictures which reveal the astounding success of the Mellor products. Along with these will be found an illustration, the work of Mr. C. W. Meredith,

of a really effective piece of scenic work which was itself a product of Mr. Mellor's firm. Unfortunately no photo could possibly reveal the beauty of the finish of this model, expecially the stone-work of the tunnel face and the realism of the cottages. But it will be conceded that it is the trees which give the final touch of completeness to the work.

Has anyone tried the use of radio aerial cable to form the basis—that is, the trunk and branches—of tree models? The scheme to which we refer is suggested in the diagram at (A). Take a length of the cable and unwind the separate strands, working first from the top end down to the lowest branch. Take out for this branch, not one strand but, say, three, and, having bent them outwards from the trunk, unravel them still further towards the extremity to form three branches. Repeat this for the other branches, sometimes using two strands, some-

FIG. 122.—Modelling Trees in Wire

times three or possibly four. Slightly flair out the strands at the base of the trunk and, having done so, solder them in that form. Force a piece of thicker wire up the base for a peg as shown. Taking this skeleton tree, proceed next as in (B) to place the steel wool. The best method of attaching the wool will be found by experiment; glue may be used in clots with advantage; it will also be found that the splaying of the smaller branches will help after the wool has been pushed down behind them. The fixing of the wool should begin right down in the centre of the tree and be worked outwards. Do not mass the material too thickly, and see that it is securely attached before proceeding from one piece to another. Next, dip the whole of the "foliage" in a bath of diluted cold glue, shake it over a newspaper and leave it till almost dry. Thereafter sprinkle dyed green sawdust all over it. The sawdust can be had already dyed in small sacks, and care should be taken to obtain the finest grade and the correct colour; avoid the unnatural green which some firms sell. A mixture of brown sawdust amongst

the green is excellent. The result will be something like (C), though an effort should be made to leave a portion of the lower branches bare where they adjoin the trunk. In the sketch the foliage is a little too dense ; there need be only enough sawdust to give a slight simulation of leaves, and the steel wool itself should not be too thickly placed. Daylight should be visible through the entire tree, and the ends of the wool masses should be teased out with forceps to a very fine texture.

The touching up of the trunk bark with paint is also enormously important. And be sure that the paint does not shine in the slightest degree.

The placing of the trees, woods and forests on a layout is also a matter for care and consideration. It is not generally appreciated, for instance, that a tree in winter form, without any foliage whatever, is just as satisfactory and striking, as a model. This is suggested in (E), while (D) shows the useful effect of placing trees in a haphazard yet careful manner—here are two close together but not losing their effect because of this. Good sites for small woods can be found in corners, preferably behind a bridge or trestle, where the one feature combines with the other for effect. Another excellent scheme, which we have never seen in the instance of a layout, is that of a dense and quite spacious wood through which the main line itself passes, and from which it emerges as from a veritable tunnel.

## MOUNTAINS, BANKS AND CUTTINGS

The contour of a model terrain can be formed in several ways, all of which have their advantages, and all of which have drawbacks. The work may be done with some form of plaster and pieces of rock, laid wet upon a surfacing of screen wire. This method is most excellent, but insufferably messy for indoors, and it requires a considerable measure of skill and practice, and the painting of the finished work is by no means as easy as is often made out. The materials are not easy to obtain and the labour is considerable.

My own favourite method is still that of using pieces of rock, old bricks, and (more generally) crushed newspapers as the sub-surfacing for hills and cuttings. The former class of material is reserved for sites where the base to be used is of heavy and

Tree Modelling by G. E. Mellor, with Scenic Model by the same Artist

sturdy construction, the latter is the more common resource. Much depends in the first place, also, upon what is the approved type of baseboard. Take as an example, a very long mantelpiece which requires to be concealed, and which is taken as the base of a mountain. An example is given in Fig. 123. After the mountain-type background has been fixed to the wall, a shape is

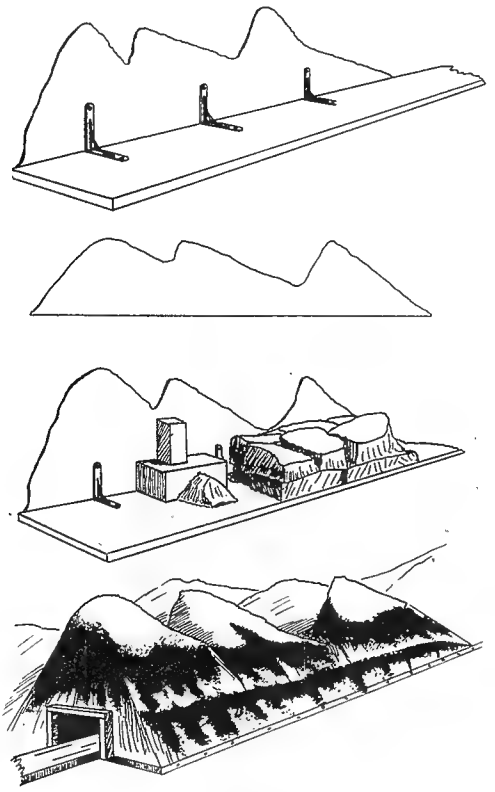


FIG. 123.—Tunnelling a Mantelpiece

cut from stout plywood having a serrated edge, and this is firmly attached to the rear wall by means of iron brackets screwed to the shelf; that is, the wood itself, while not attached to the wall, is forced up against it. Next, a barrow-load of old bricks and pieces of rough stone are carefully arranged on the shelf to form something like a regular yet irregular upper formation, sloping upwards to the wall. Wooden frames for a tunnel entrance and exit are next fitted, probably to the side-edges of

the track-bed batten, the latter being screwed in place. Finally, a length of old casement cloth or blackout material is attached behind the top of the plywood, by forcing panel-pins through the wood and the cloth behind it, and the cloth is then brought down to hang loosely over the lower front edge of the shelf. The work now begins of starting at one end and, by folding, tacking, bundling and twisting the material, and occasionally by pulling it tightly down over the front edge and tacking it secure, the outer surface of the hill is formed. If required, bundles of newspaper can be here and there inserted under the cloth. An effort should be made to form an uneven, natural, and convincing job. When it is finished, painting may begin. First, patches and flatter surfaces on the top are coloured with flat-drying grass-green oil paint, two or three coats as required. Then the more precipitous front walls of the hill are touched up with dark brown, fawn, cream, and grey, always —or most frequently, working the brush lightly from the base upwards, breaking off at the required edging of the rocks underneath. The brush marks, should be also widened from the bottom upwards to give the correct appearance to the fall of the cliff. Darker hues should be given inside small ravines according to the incidence of the light. Finally, trees and shrubs may be carefully located and secured in place. It is a good plan, along the lower edges, and rising about an inch above the track-level, to coat the cliff with glue and sprinkle while hot with chicken grit or coarse sawdust, which can later be painted to taste, or, if of a natural hue, left as it is.

Small hills can be similarly made; but when it comes to the making of a cutting where the base-structure is not of the old style table-top kind, the work is rather different. Nevertheless, the crushed paper method has strong claims. In Fig. 124 there is a scheme given for this work. Shaped forms are made of plywood, each one varying slightly from its neighbour, the fretsaw being again brought into use. The track-bed having been screwed in place across the batten edges, the plywood pieces are then attached with screws to the sides of these battens as shown. Next, between each couple of these forms, a series of stout pieces of stripwood are arranged as cross-menbers on which the covering of brown paper can be laid and to which it can be attached. The crumpled papers then go on the surface of this brown paper (or cloth can be used), and the final contour of the hill and cutting can be then laid above these bundled papers

by again using thin cloth, calico or similar material, tacking down the material securely at numerous places. The colouring up of the finished work is carried out as before.

Another type of cutting is shown in Fig. 121. This is a cutting having a way-fence along the top edges of the cliff walls, as mentioned in the last chapter. The first sketch shows how the side-walls of plywood are attached either to a flat table or to exposed cross-members, and the lower sketch indicates what the appearance of the cutting should be. In the two following sketches (Fig. 125) there are given a couple of suggestions of

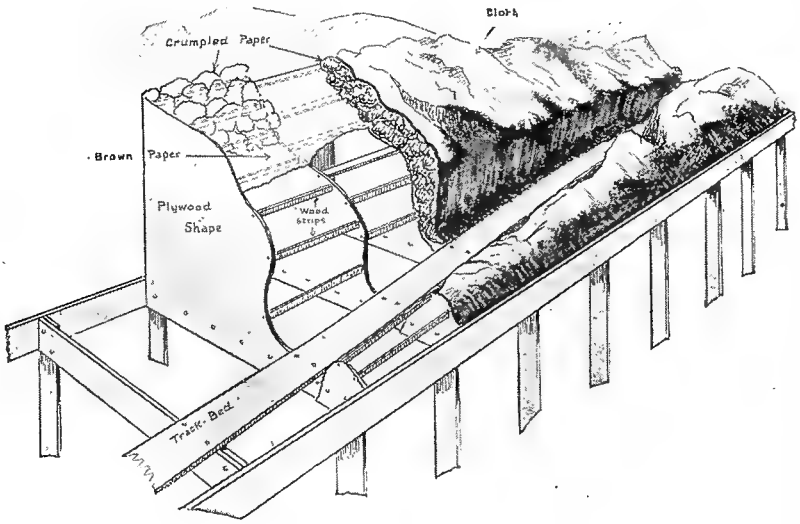



FIG. 124.—Forming a Cutting with Lath and Paper

interesting and attractive banks and cuttings, the first being an example of a cut-and-fill where the tracks pierce a somewhat regular hill. Note that on the facing of the plywood sides there must be space left for the crumpled paper, these being shown in the earlier sketch by dotted lines. The other sketch gives a suggestion for that most attractive railway feature, an Alpine pass, where the bank is modelled as if cut from and built up along the precipice facing. These examples will well repay the time and thought required for their construction, and they are by no means difficult to model.

Where the work of making banks or cuttings does not cover a wide range, the methods formerly advocated by the writer are still most emphatically recommended. The very best

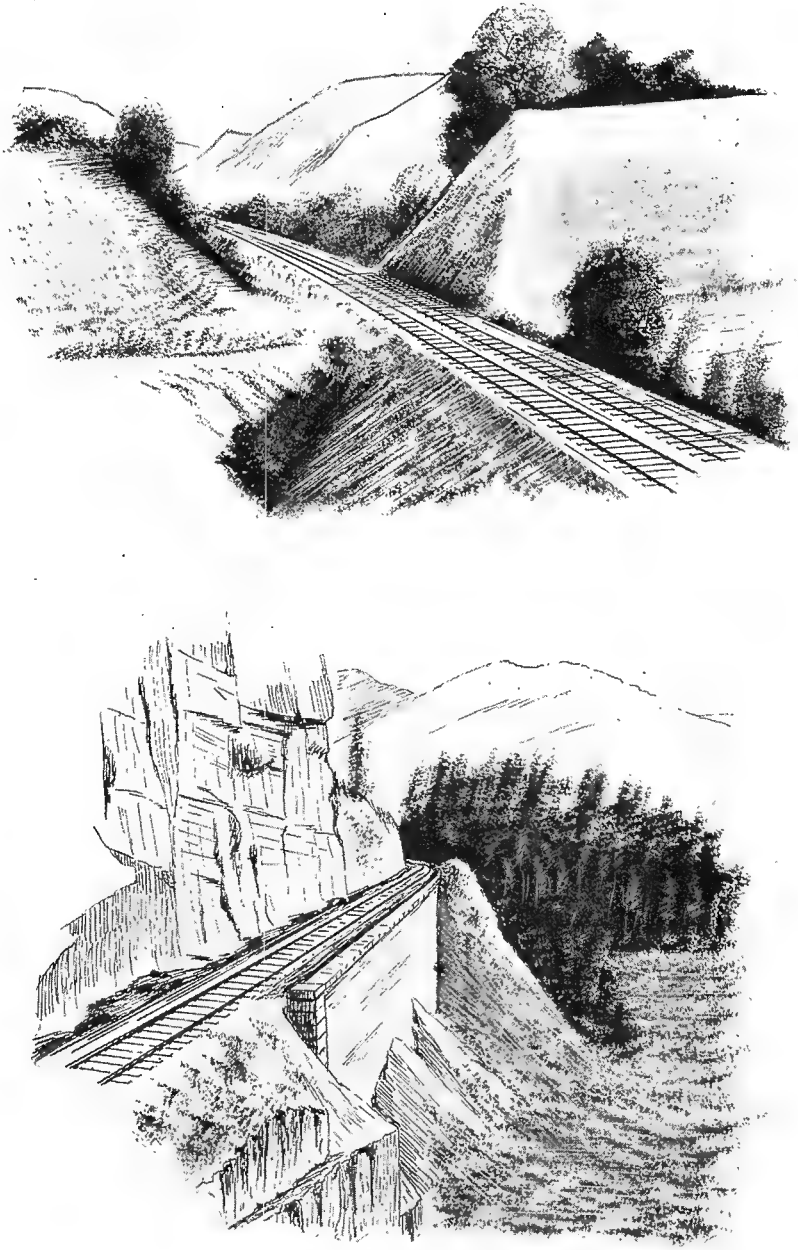


FIG. 125.—A " Cut and Fill " and an Alpine Pass

material for small jobs which do not exceed the capacity of the size of the rolls or commercial sheets, is plaster-of-paris lint. On the new West Midland Lines there are several such locations adjoining bridges and viaducts and invariably this medium is called into requisition. The lint should be cut to the size required, in one piece if possible, soaked in water, squeezed out, and tacked and strained tightly over the crumpled paper filling the cavities. It will dry hard and distinctly rocky, and will take a flat paint admirably.

Speaking generally on the subject of the scenic side of railway

Scenic Work on Layout of Rev. Guy Macbeth

modelling, it may be remarked that many writers have disparaged scenic work on the alleged grounds that it detracts from the interest concentrated on building and operating the layout of a railway. But it surely ought to be borne in mind that hills, valleys, cuttings, enbankments, roads, rivers, villages and even factories form themselves an integral part of the railway. A railway engineer requires to survey and to plan through a certain terrain, and this fact has the most enormous influence upon the types of structures he will stipulate for certain locations. A bridge is not simply a way over a road, river or railway ; it requires to be a certain kind of a way, as decreed by the geogra-

phical conditions to be met with in that locality. Scenic and contour work are therefore an integral part of railway modelling. It must be remembered, however, that scenic effects do have an influence on the interest of the railway itself. Merely to crowd these features in every odd space is to give the whole vista a jumbled and over-invested atmosphere. Judicious deftness in the matter of this work should be constantly studied ; nor should it be forgotten that one of the finest functions of scenic contour is that of concealing trackage which would otherwise appear congested by reason of the exigencies of layout-space.

## A DETACHED VILLA

For the advantage of those who desire to construct house-models for completing the scenery on a layout, it may be well to begin with a plain and elementary example of architecture —a small villa such as might be seen in any modern housing scheme—before proceeding to more advanced subjects. The building to be dealt with is entirely representative, with its bay windows, dormered roof and chimney stack. In Fig. 126 we have fully dimensioned drawings for its construction.

The perspective sketch gives the type of building to be worked upon, and the various diagrams give accurate designs for the walls and roof. (A) shows the front, (B) the side, and (C) the rear of the model. The other elevation will be exactly the same as B, and therefore needs no separate design. Begin by cutting out a flat piece of cardboard—plain white board about 2-mm. thick is best—to the size of (A). Note that the bay window is a later addition. The wall itself simply requires the door aperture and the window above it. Mark these out accurately and cut them with perpendicular cuts, using a razor knife, metal rule or Meccano strip, which forms a good straight-edge. The section of cardboard for the bay window is shown in (D). It is left till a later stage. Mark out the circular top of the porch with compasses and cut it with very small sharp scissors, using a piece of glasspaper to make a good smooth shape. Next proceed to the other walls, noting that they terminate at the eaves, as the front wall also does. The upper storey is finished in cream poster colour or water paint. When the walls are cut, with the various apertures, the edges of the latter should be at once given a coat of this colouring ; it will quickly dry. The

lower storey is best finished in brick paper. This brick paper should be stuck on immediately after the walls have been attached together, and before the windows are undertaken.

To attach the walls together, use short strips of gummed parcel paper cut no wider than a half-inch. Lay the walls

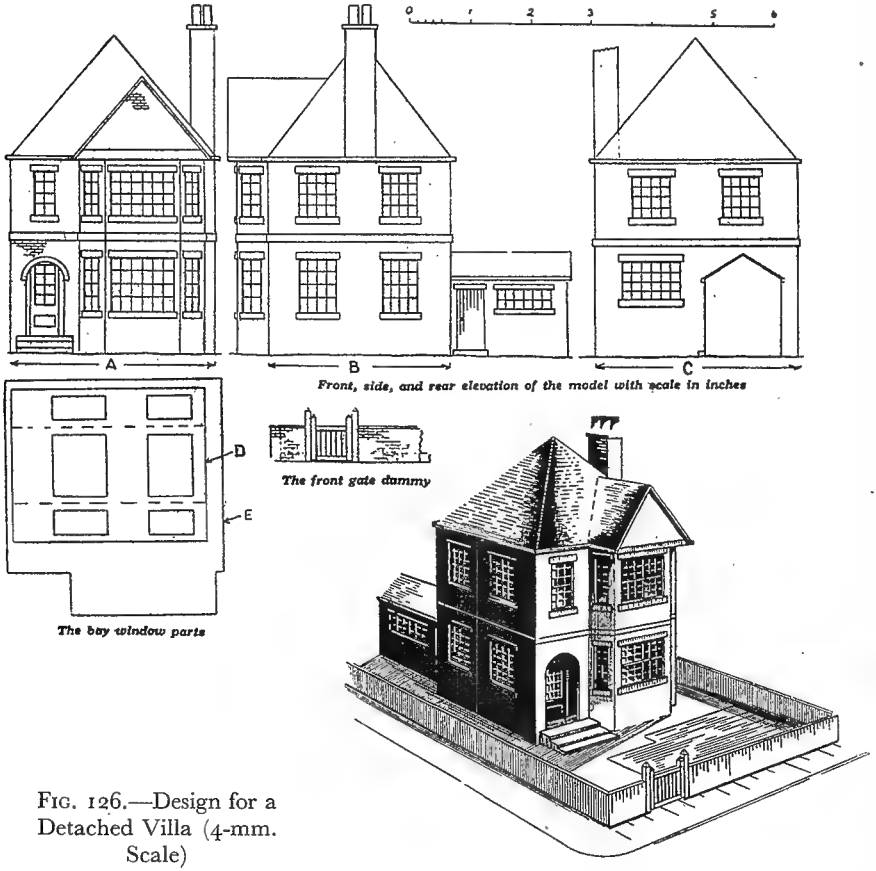


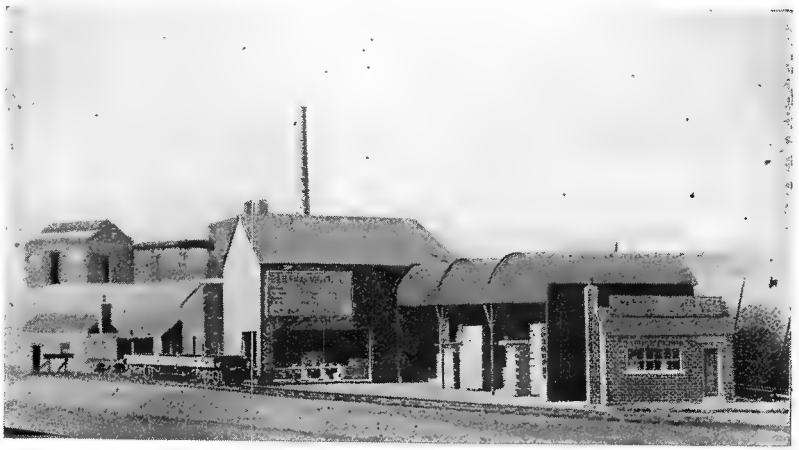

FIG. 126.—Design for a Detached Villa (4-mm. Scale)

on the table, keeping them straight with the table edge and preserving a gap between each wall of the same thickness as the card. Now fix the adhesive tape and, when it is stuck, bend the walls to form the square building, attaching the loose wall-end when the square is formed. Now fix the brick paper, cutting the paper diagonally behind the window spaces. This allows the window edges to be turned in to form a brick-finished aperture for the windows. Remember that the brick paper

only covers the lower storey, as high as the horizontal plinth. Now cut a square piece of card for the floor, an exact fit inside the building, and glue it by the edges in place.

Windows are made from sheet celluloid of a good thickness. The sashes are scribed on the celluloid with a harsh-pointed scriber and ruler, the window being then painted with white poster colour and left to dry. When dry, rub off the paint with a duster and it will leave the sashes white. Note that sashes must be an exact fit in the wall apertures.

Home-made windows must have a projecting lap of celluloid all around the inside of the apertures. The celluloid is fixed



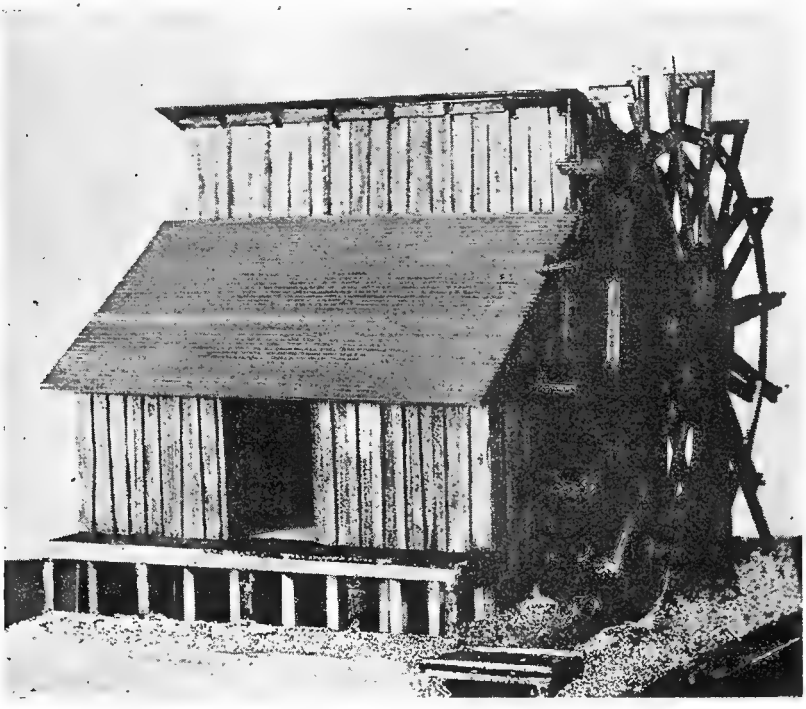
A Realistic Timber Yard by Mr. J. H. Ahern. The circular saw is visible in the mill

by gluing these overlapping edges lightly and then fixing strips of adhesive tape over the lap and on to the inside walls. If you wish to have the windows curtained, the curtains may easily be made from pieces of blue or yellow paper stuck inside the celluloid, and this should be done next.

A piece of card should now be cut to fit exactly inside the top of the building. Do not, however, fix it yet: First cut the larger flat section shown in (E), which goes on the top and forms the projecting guttering for the roof as well as the overhang for the bay. Glue the card which fits inside the top on the underside of this larger piece, fitting it centrally. Then, when it is set, attach the whole to the top of the building. Before doing this, however, the inside form of the porch, with the door,

should be fitted, a piece of wood of correct thickness is glued in for the floor, and the L-shaped porch rear, with door to taste, is fixed with tape. . Do not forget to cover this wall with brick paper before finally placing it.

The roof is made by the cut-and-try method, but the lengths of the four sections across the eaves can be taken from the drawings. The gable is an extra piece attached along the eaves



An American Scenic Water Mill

with tape passing underneath the bay overhang. Similar strips of tape are fixed along the valleys where the gable adjoins the main roof. The main roof is built up with tape-strips before being fitted, the tape being trimmed off with scissors. The whole roof is then fixed with glue around the bottom edges. The chimney stack, brick covered, is a length of solid stripwood, which gives sharp corners. The chimney pots are of dowelling. If the tiny pieces are not cut at right angles they will not stand upright. Note also that the gable wall above the bay—a piece of card attached with tape to the underside of the overlap top

—is also brick covered. The entire roof is covered with roof paper of the red-tile type. On the two opposite sides the paper overlaps the edges ; on the other two sides it is trimmed flush with the scissors.

The window sills are of cardboard strips, and the plinths on the walls are similarly executed. Strips for these purposes should be cut and painted in lengths before being fitted in place, not forgetting the painting of the edges. The rear kitchen extension is an independent piece of work which needs no extra instruction.

A design is given for the front gate, which, of course, is a dummy only. Match sticks and cardboard go to the making of it. The garden wall should be of ½-inch stripwood, brick covered on all sides and can be fitted over a suitable base by leaving the outside brick paper overlapping and turning this overlap under the base itself. Strengthen the corners of the walls by pushing in pins from which the heads have been snipped. Bases for such models can be laid out and finished to represent trimmed or plain lawn, footpaths in thin gravelled paper, and so forth.

## A MODEL ROADHOUSE

Having described a reasonably simple model let us now proceed to something rather more elaborate. The proposed model is shown in the perspective sketch.

The difficult part of the work mainly attaches to the measurement and cutting of the walls from suitable cardboard. This material should be somewhat less than 1/16 inch in thickness of the smooth and hard white variety. To simplify matters you will find in Fig. 127 complete templates of all the walls. The small centre template is intended for the coach-house and stable, which is a separate building. The templates are accompanied with a scale, and with this for a guide they should be carefully drawn on the cardboard sheet. The mark (B) at centre joints denotes " bend." That is, a slight cut only should be made on the surface of the card and the wall then bent back along the line. The window and door apertures, of course, should also be cut out entirely, using a razor knife and metal ruler, and care being taken to hold the knife exactly perpendicular not sideways.

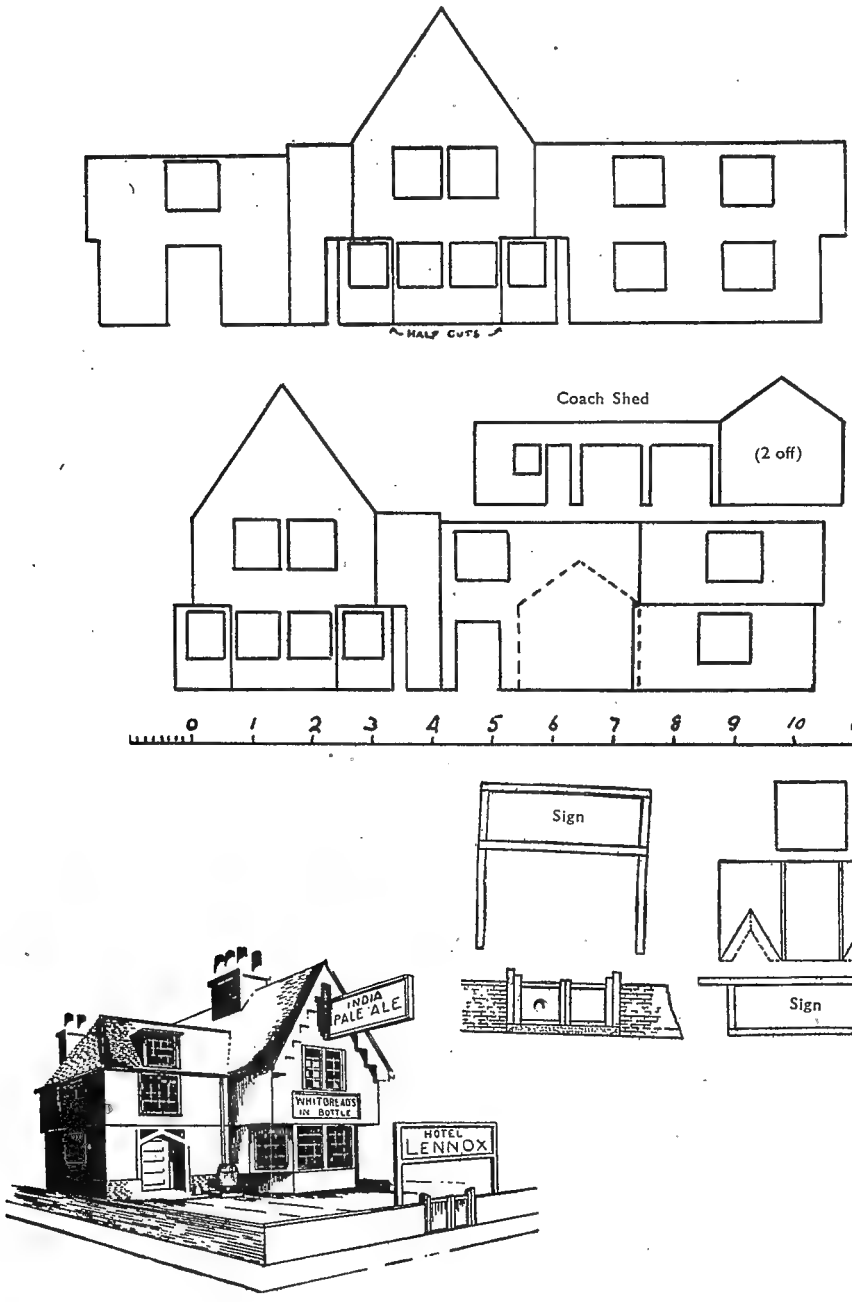
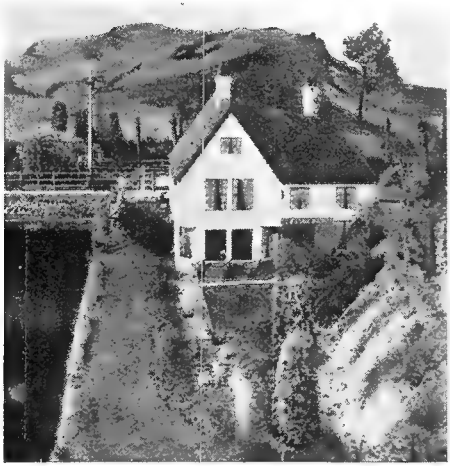



FIG. 127.—A Roadhouse (4-mm. Scale)

Remember that the size of these apertures will depend on the kind of windows used. If you make the windows in the manner already described, scribing lines on celluloid sheet for



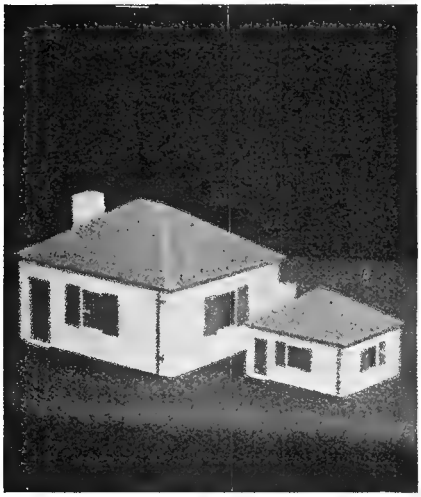
A Model in O-Gauge of the Roadhouse, built for Mr. V. Boyd-Carpenter by G. N. Slater of Timperley

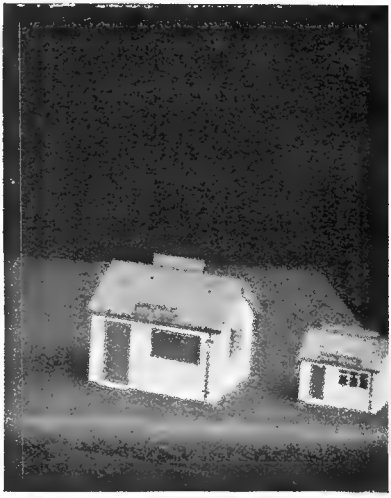
the sashes, you can cut the holes to the sizes shown. But if you use ready-make commercial windows, draw the apertures to suit the outer edges of the sashes. First get these walls cut and shaped. Compare the two gables as they will be erected, back to back (and see that they are exactly alike. The dotted gable

in the drawing is merely a suggestion as to where the coach house may be placed, but any other place in the inn-yard will do.

You will discover that the sides of the bay windows will when

Modern Housing Scheme Buildings (OO-Gauge) by Kenyon





Cottage and Coal Office in O- and OO-Gauges by Kenyon

bent back come exactly in place with the side walls and across the corners of the building. Use adhesive parcel tape, if you wish, for binding back the edge of the bays as well as for joining

the walls not already joined. But do not do so yet : this is a job for later.

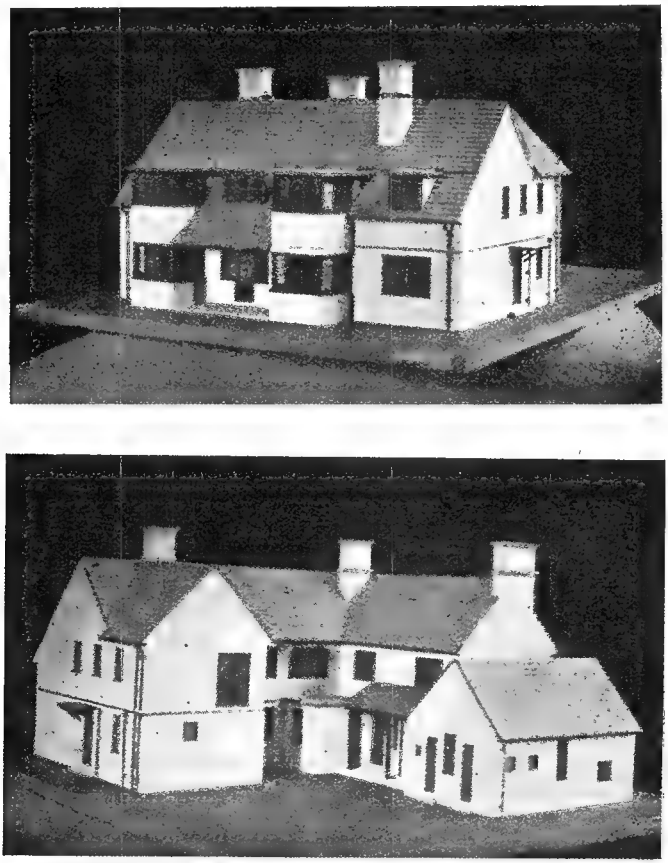
First, when the walls are shaped, fit the brick paper or stone paper, if this is going to be used. This is recommended only for the lower floor. Thus, it should consist of a strip rising to a height just above the top edges of the bay windows all round. Glue the back of the paper, stick it in place, turn over the card and cut the cross-cuts at the window and door openings as described already. Push back the loose glued tabs and fold them back on the inside of the apertures, thus covering the window and door edges with brick paper. Now fit the windows, being extremely careful to get every one of them square and level with its neighbours. Keep the window surfaces clean. You should fix the windows by running a fine line of glue along the outer edges of the celluloid, then binding them in place with strips of parcel adhesive. Your margin of spare celluloid will be very slight where the bays bend backwards, but there is enough space. If you wish you can leave out the glue and adhesive in these very narrow edges, so long as everywhere else you make a strong joint. Follow on by making a shaped floor of cardboard to fit precisely as a bottom floor of the building. This can be done by carefully measuring the lengths of the walls. Use a set-square to get things absolutely correct.

When finished, make a second piece just the same, to serve as a kind of ceiling at the top. The ceiling piece you can easily fix by using strips of parcel tape, setting the ceiling inside the walls and bending the tape over the inside edge of the walls. The tape will not show through the white poster-paint you will later use for these walls. Trim off the surplus tape if any of it comes below the window openings. The best method of fixing the floor is to allow for the brickpaper on the walls to overlap, turning the overlap on to the floor when it is in place.

Before placing the roof, make a little porch for the front inside of the building. Simply three walls bent to shape, stuck securely with tape, will serve. The door can be made and fixed from inside later. Also back the rear door aperture with card and glue. The roof can now be fitted, beginning with the main roof in a single piece half-cut along the top, absolutely rectangular, and with ample overlap at the edges and eaves. There should be an overlap of $\frac{1}{4}$ inch on each side. Having fixed the roof with glue, wait till the glue is set before forming the extension roofs. Begin the work by cutting one piece, as for the main

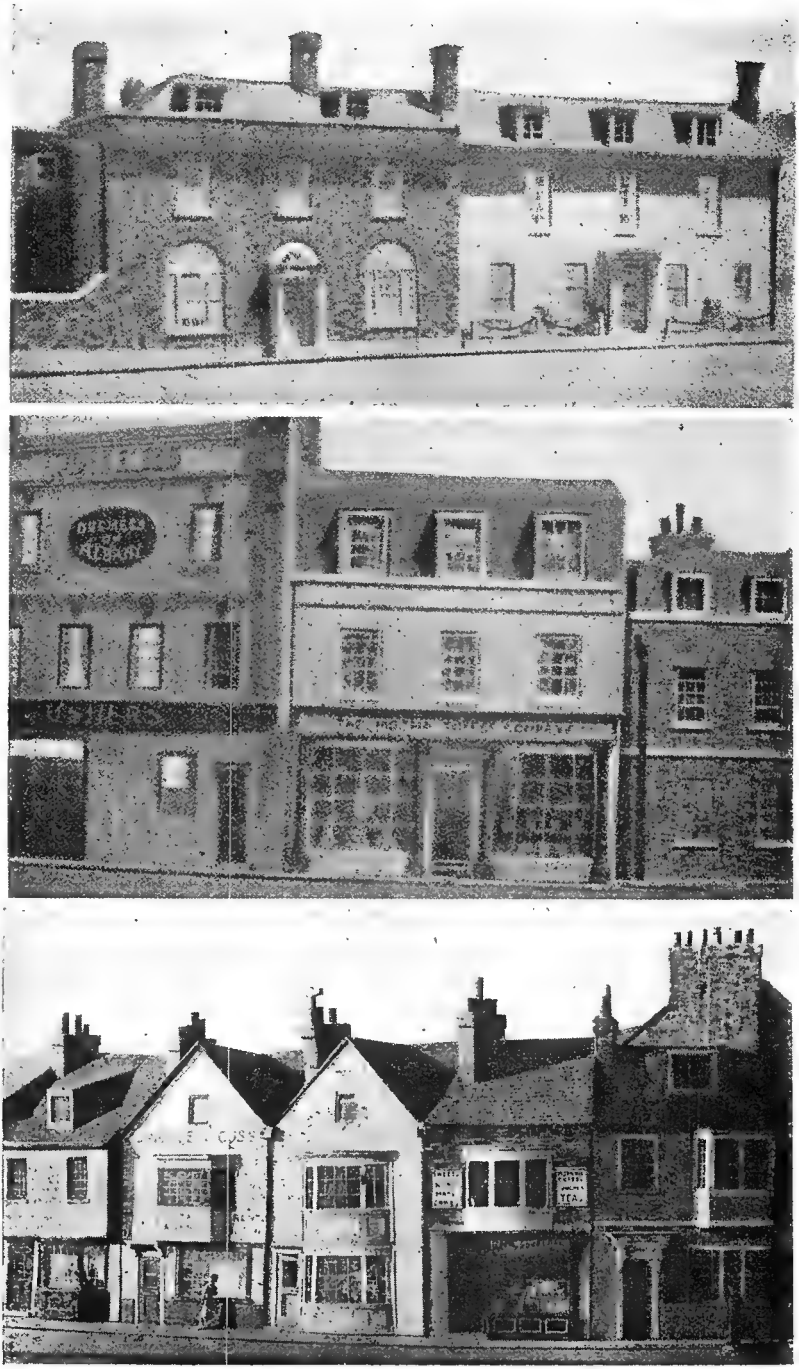
roof, and half-cutting down the centre to fold. Next shape the inside edge of this piece by taking the angle at the edge of the main roof in front of the gable. Cut out the portion and mark off a similar angular section on the other end of the extension roof, using as a guide the piece you have just cut out.

Where the open end of the smaller roof joins the main roof,



A Detailed Residence (O-Gauge) by Kenyon

it will be necessary to fit a bearer of cardboard well supported. This is attached to the side of the main roof. Finally, a piece of card is cut to fit the outer open end, and is made a perfect fit by experiment, after which it is attached with parcel strip to the outer edges. The extension roof may be stuck in place after any necessary trimming of the eaves.



Some Convincing Semi-Flat Background Buildings by Mr. J. H. Ahern

The ornamental work under the main gables was executed in the original model by using some strip sold in America for O-Gauge model staircase risers. But any thin strip—the fine plywood sheet about a millimetre thick is best—can be carefully cut to shape for this job. The ornamental board is glued to 3/16-inch strip wood lengths set right in along the under edges of the gable roof. Both gables are alike, of wood angle of an L-section. This wood section only measures $\frac{1}{8}$ inch each way and is ideal for a score of tasks, including, especially, guttering. For this purpose it was used here, being painted before being cut, and fitted with glue along the edges of the eaves. For a ridging on the roofs, use a length of cage-wire and a covering of Merco ridge paper. Both roofs were covered with tile paper, in red. The upper half of the walls were finally given two coats of process white water paint. The water butts were a simple matter. They are barrels issued as an advertisement, drilled and fitted with a length of cage wire for fall pipe and fixed with glue on wooden bases attached to the walls.

Small drawings give details of the walls around the garden or yard. The wall is of $\frac{1}{2}$-inch stripwood covered with brick paper which is turned over on the underside of the base. Note that the stripwood lies along the top of this base, and thereby keeps it from warping. The gate is of cardboard strips glued as a dummy, and afterwards painted white. The method of forming the chimneys is shown. For chimney pots use 3/16-inch dowelling, but be absolutely sure you cut the ends square. The various signs are easily made, glued wood strip on card being used, and the signs are taken mainly from paper match-boxes.

The finished model can be made very beautiful by judiciously adding a garden hedge inside the walls, and a representation of gravelled or asphalt surfacing of the inn yard and the footpaths. Paint the chimneys above the white sides a flat stone colour, and the chimney pots likewise, after touching them up with black. The little dormers, of which there are three, are very simply made. They are directly built around one celluloid window with its margins, having two shaped sides and a flat top. Two little mouldings of the L-section strip are added or any fine strip will serve. The inside of these dormers was painted black so the roof behind was blacked out. In forming the chimney stacks, the four shaped pieces of card are entirely covered with parcel tape, leaving gaps to allow for the overlapped joints. A single fillet of card serves to keep the stack square and rigid.

## ROADSIDE GARAGES

A model of a roadside garage is both topical and useful, being an essential feature of road traffic, which is frequently modelled in conjunction with a railway layout, and being acceptable for occupying an otherwise vacant corner on a highway. The prototypes vary considerably, nor is it an entirely easy matter to secure details of a good original. There are the country types of building—often little more than a shed or series of sheds and ranging to a neater but most frequently a small structure. There are also the buildings, often quite ornate, to be seen on important main roads or side streets.

Four such designs are given in Figs. 128 and 129, the first being one which would happily fit in with a Colonial or American system. It follows the log-cabin-with-iron-roof style, and has a water tank above it suggestive of a distance from the nearest spring. The construction is simple and can readily be followed from the drawings which give all the important elevations. The veranda around three sides serves to cover a space for refreshments, and various signs culled from the magazines adorn the walls and windows. The windows are sashed, as they would be on such a building, and an outhouse and pumps complete the arrangements. The second design is entirely different, being taken from an original which stands at a corner of a large public street. It is finished in the concrete style, with semi-ornamental sham roofs visible from the footway but terminating at the parapet, and the showrooms around the sides have plate-glass display windows, in which various items such as dummy drums of oil, machine parts and back-screens of adverts are shown. The petrol pumps, as in all these instances, are made up from scraps of stripwood and have tiny printed notices taken from pictures in the press. The only difficult part of the building here consists of the roof-sections around the frontages, and details for these are given in Fig. 130.

The other two designs are for similar usages ; the first for the open country highway, the second for the city block. The first of these follows the simple type of modernistic construction and design, the second is a little more ornate, and offers scope for the use of a fancy brick paper and some of G. N. Slater's various strip-card mouldings. The lantern lights on the roof are easily made. The shop window is an outstanding feature,

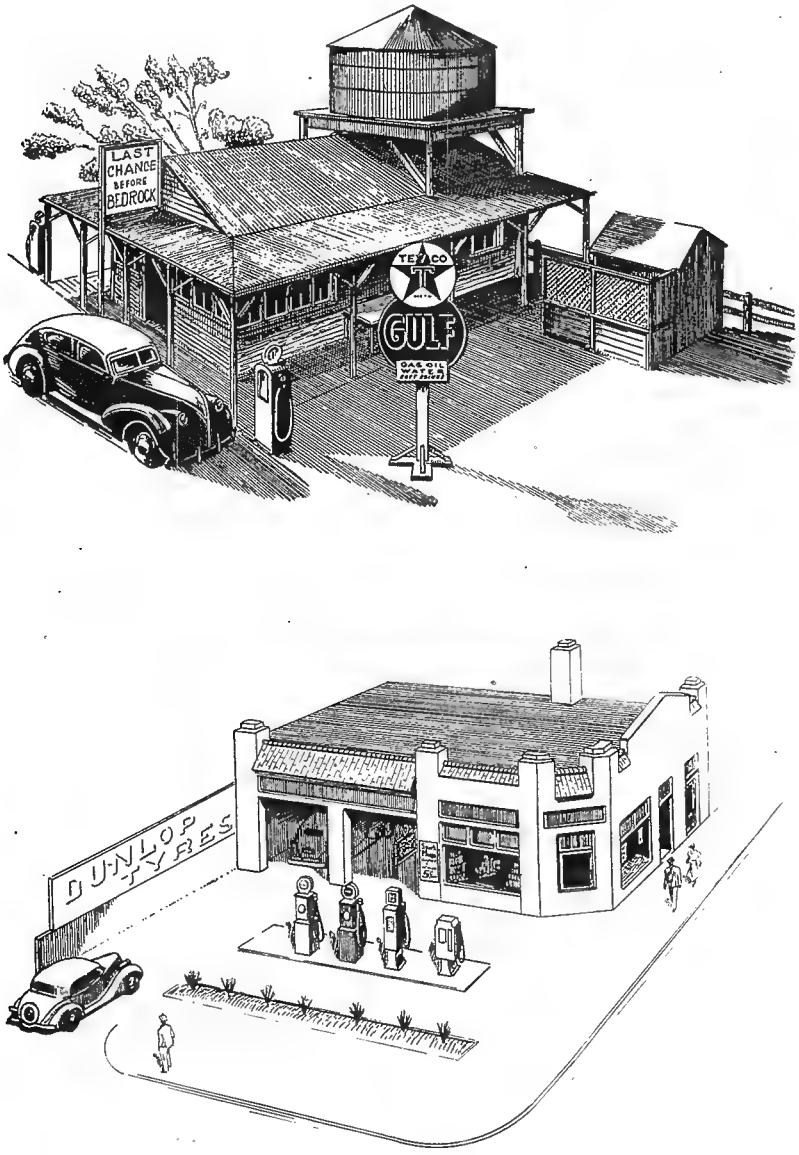



FIG. 128.—A Couple of Garage Designs, Colonial Type and for a Town Corner

and in Fig. 130 there are full constructional diagrams. The counter may be a solid piece of stripwood around which the thick celluloid window is shaped and affixed with adhesive tape, over which the paper brickwork later goes. On the display counter may be fastened a Skybird motor-cycle, suitably

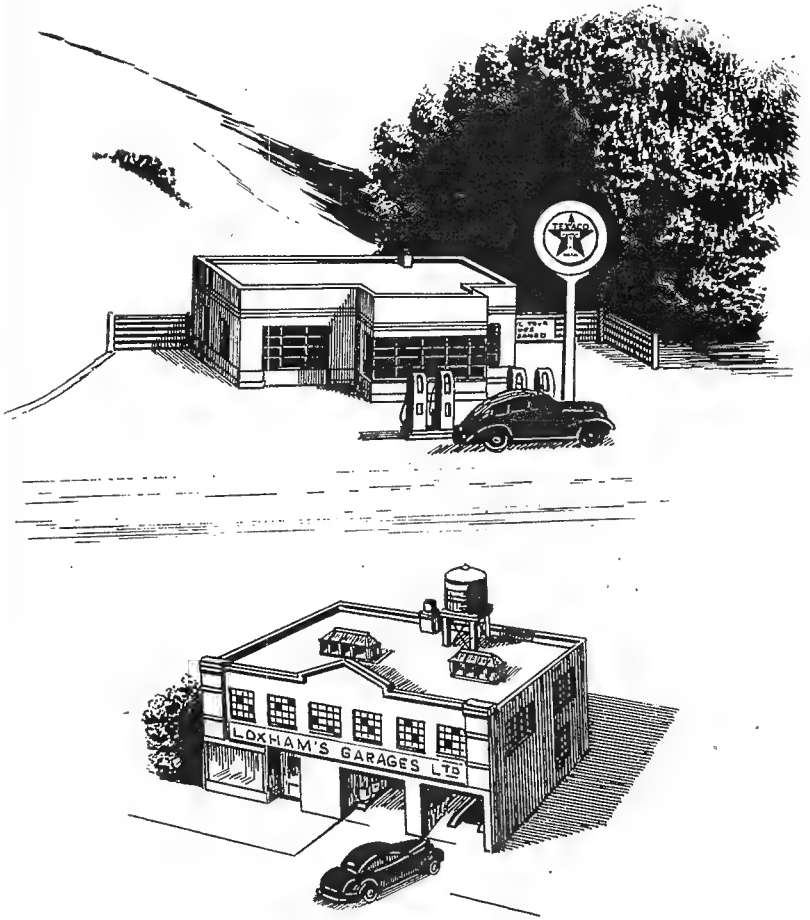



FIG. 129.—Two Further Designs for a Country Highway and City Street

enamelled. look out in the periodicals for suitable notices—they are legion—and set these in place where they relieve the walls and add the note of realism. The interior of the showroom should be lined out with the same brick paper as is on the outer walls. The shop door is formed in detail on a piece of scribed window sash before being set in its place. No door

are really necessary for the car entrances, though the inside walls should all be bricked and the floor might be either concrete-painted or covered with pavement paper.

Two of these models have been constructed by the writer—

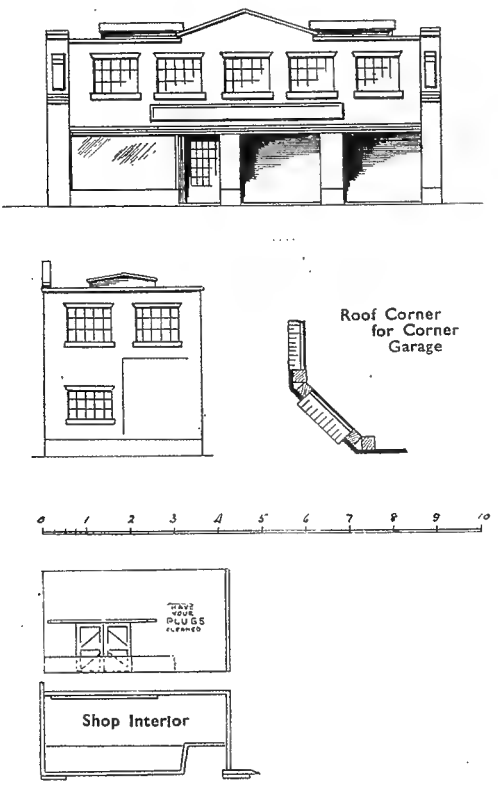
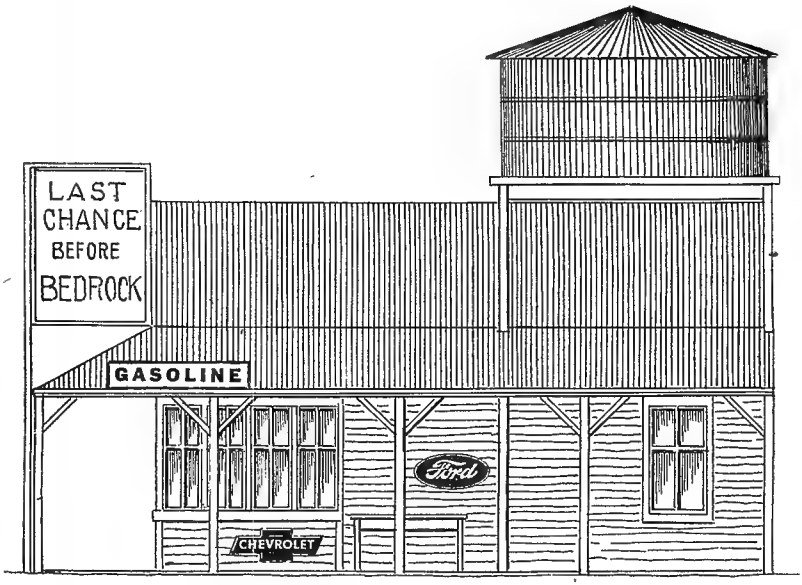


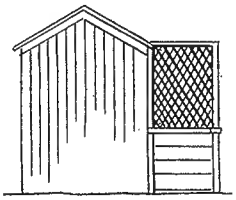

FIG. 130.—Diagrams for Town Garages (OO-Gauge)

the second and the last, and it can be safely stated that they form very imposing and effective models.

## MODELLING CONTEMPORARY ROAD VEHICLES

Part of the objective evidence that a street is a street or a freight yard a freight yard on a layout consists in the provision of convincing scale models of lorries, omnibuses, taxis and cars such as are seen in the world at large to-day. It is not until the scenic artist begins to observe the vehicles on the highway



An out-of-doors edifice, side view.

Scale: ⅛″=1′-0″.

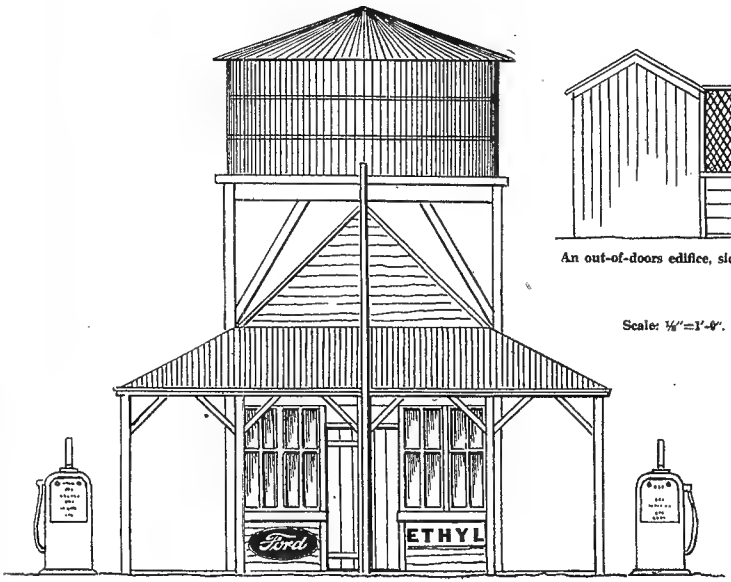


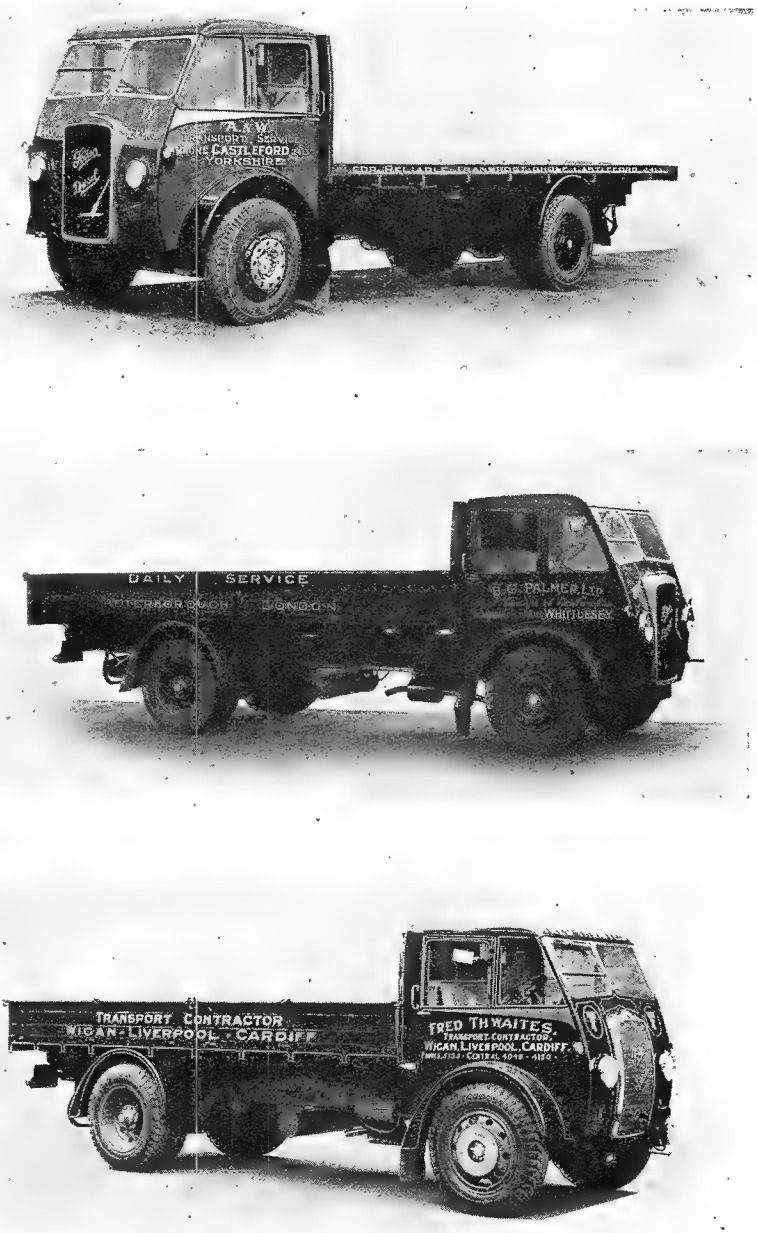

FIG. 131.—Elevations for Colonial Garage

for the purpose of gaining information to this end that he realises what an enormous range of prototypes exist. Motor lorries are not really very difficult subjects to duplicate in miniature ; but there is some awkwardness, which so far seems to have baffled the enthusiast, about the modelling of private cars. It is unfortunate that nearly all commercial lines, of which there are many, fail to satisfy the standards of the fastidious scale worker, though where lorries are concerned the situation is a happier one.

Dealing first, then, with the subject of road lorries, it may be of help to furnish photos of a few typical examples. These will be found useful as a guide to general style and to the disposal of lettering, and so forth. The first group shows three standard Foden 4-wheeled models, one having a plain flat body, the other two having sides. The next group gives examples of increased wheel and tonnage capacity, the first two being 12-tonners, one with eight wheels and sides, the other with six wheels and a plain flat body. The next lorry is similar, with four-wheel steering, and the fourth is a 12-ton chassis furnished with a standard Foden tank body. The fact will immediately suggest itself to the model craftsman that for the creation of miniatures the work will naturally fall into three stages : the chassis, the cabin and the particular form of body required.

It will also be good news that one enterprising manufacturer has specialised in the provision of parts, complete building kits and finished examples of a large range of these vehicles and others similar to them. A series of these well-known Wilson lorries will be found in the next set of photos and in the several drawings by Mr. Baskerville which immediately follow. The photos, for the use of which I am grateful to Mr. Bassett-Lowke, depict models which, immediately prior to the war were all obtainable from Mr. Murray Wilson or his agents, built accurately to scale for O-Gauge and OO-Gauge. There is an unlettered 8-wheel van, a 6-wheeled open lorry with sides and a 6-wheeled cattle lorry. The tractor transformer lorry and plain 4-wheel flat are also extremely characteristic, and the third picture shows five different types of 4- and 6-wheeled vans.

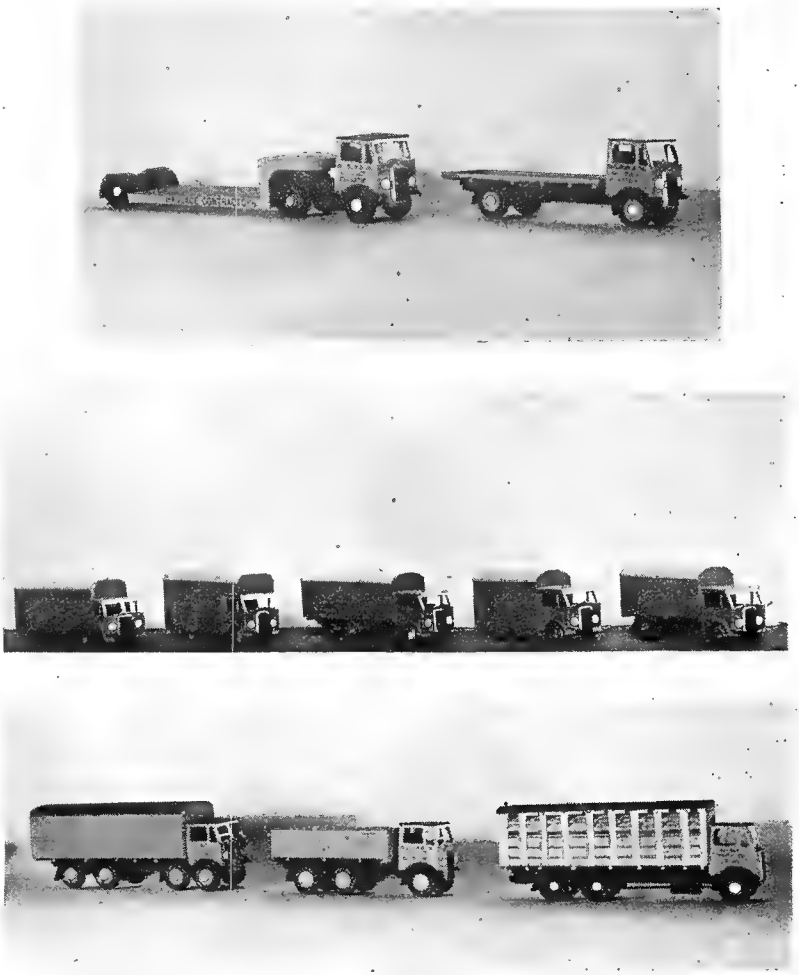
Passing on to the excellent drawings which Mr. Murray has kindly furnished, we have an 8-wheel heavy van and an 8-wheel timber lorry, both of the rigid chassis kind. The American type tractor-van which follows is not yet on the market, but it will be shortly, and a splendid model was submitted to me some time ago showing the style of it. The eight-wheel tractor model,




Three actual Foden 4-wheel Lorries

Four Heavier Foden Vehicles

complete with jockey wheels and every other refinement of detail, will make a most acceptable line, and the detail diagrams and sketches will also be found extremely useful. Finally, the petrol tender for use at aerodromes is a most excellent example.



Representative 4-mm. Scale Wilson Lorries of pre-war design

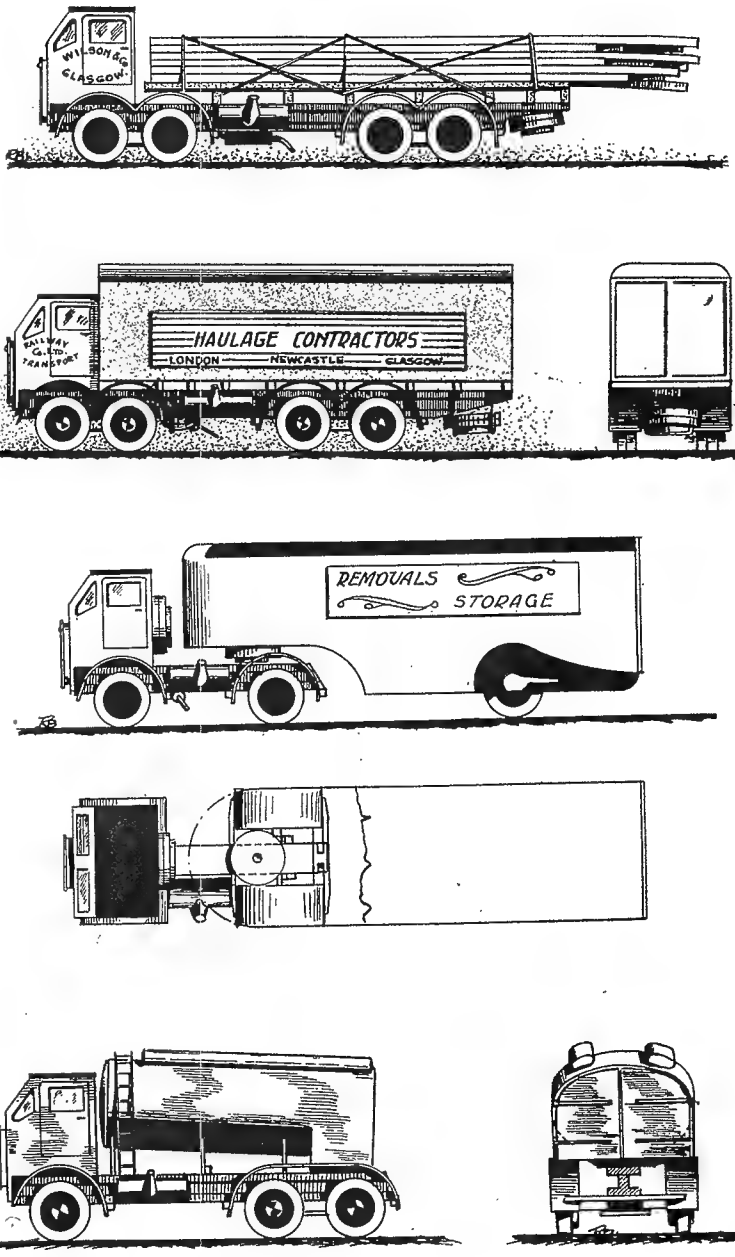
These foregoing types will all be produced as soon as conditions permit, but those which follow are and have been for some time on the market. The bodies, cabins, and so forth are supplied in full colours and complete with all lettering. A solid

form of construction is generally used for the van bodies, though exceptions are to be found in the cattle van and the Army Commando van. If it is preferred to resort to home construction, kits may be had for this purpose.

It is also possible to obtain complete parts, as desired, for any type of vehicle, and in these parts there will be found a great help for those who wish to work on their own designs. The range of these parts was, prior to hostilities and restrictions on materials, most admirable, and there is every intention on the part of the manufacturers to revert to these as soon as possible. Notable were the splendid rubber tyres, complete with detailed treads, and the disc wheels to take these tyres. Cabins may be still separately had, neatly stamped out in cardboard and correctly coloured and lettered ; and it is one of the intentions of this firm to bring out a metallic cabin assembly when this can be done. The main chassis member for a lorry consists of a specially moulded length of stripwood of correct H-section, this being shown in Fig. 134, which also gives details as to the building up and fitting of the cabin. Windows are of celluloid. In O-Gauge there is an excellent system for springing the wheels of each vehicle, the wheels, of course, being arranged to roll.

For those who wish to do their own constructing, these road models, and others akin to them, can be built in two ways, from cardboard and from metal. The ideal method is the second, though the simpler manner will commend itself to those not accustomed to soldering. The chassis can readily be made from stripwood and card-strip. Cardboard will also serve well for the cabins and bodies. Planking should be scribed before painting. A fine method of fitting correctly rolling wheels is by using the standard Wilson wheel discs and tyres (when available) with a length of medical applicator for an axle, fixed with glue to the discs, which will be found an exact running fit for the correct size of Rawlplugs, the latter being filed flat on one side for sticking to the chassis. Splendid metal discs for the wheels can be formed from the smaller size of common laundry studs, the head of the stud being filed off and the axle forced through—a tight fit.

In connection with cardboard construction, it must be mentioned that one of the Modelcraft card-sheets designed by the writer gives a series of three scale lorries, any one of which can be chosen and completed from the sheet, the sheet including one chassis and a range of three lettered and coloured bodies.




(The above designs are three-fifths full size for OO-Gauge)

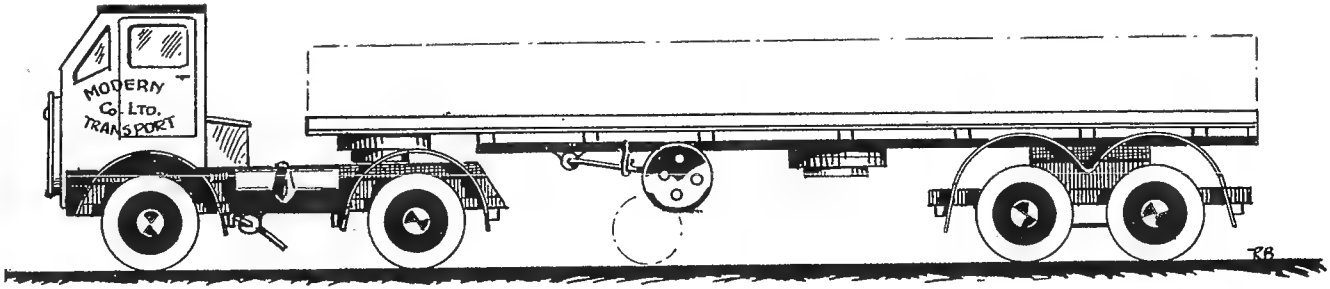
FIG. 132.—Forthcoming Wilson Lorry Types

These are shown in the sketch (Fig. 137). An outline design for a tractor transformer lorry is also given in Fig. 136.

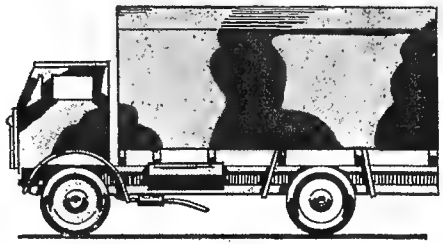
The procedure with metal construction will be much the same as that described fully in connection with metal railway vans. Tinplate may be used throughout, with perhaps the aid of a length of brass section-strip for the chassis beam. The celluloid windows for the cabin can be wedged securely in place when the latter has been built, by using the solid strip of wood which forms the driver's seat and the soffit of the cabin roof. The painting of the cabin is best executed before the windows are fitted, the final job being the securing of the roof, which could be of very fine fretwood or plywood.

A design is given in Fig. 138 for the two sides and rear end of a standard double-decker omnibus. Celluloid and card, with the addition of a little stripwood are used for the entire job. The stripwood body-base or chassis is shown in Figs. 138 and 139, the latter sketch giving an exact idea of the shape and the attaching of the mudguards, the former giving the dimensions. The floor of the rear entrance is of thin fretwood, attached with glue to the main member. Sizes and details of the cabin parts are given, and the lower sketch (Fig. 139) shows the method of assembling the body, which is cut from bristol-board of a fairly thick calibre. The lower deck of the bus is first built up around the chassis-block, a shaped wooden block then being added and glued to form the lower deck roof and to project to take the sash-mask. Shaped pieces of celluloid then fit inside the upper deck sash-mask, and a soffited roof secures the whole. The stairs are an easy feature to model, only the lower ones being visible, the stairway wall being a dummy. An effort should be made to secure the rounded, streamlined rear portion of the upper deck by means of sandpapering the wooden roof when finished. Similar rounding-off should be given to the rear of the back entrance to the bus. On the main body there should be no corners visible.

The taxicab model will be found more difficult, though here again the work is all carried out in wood and card, with celluloid for windows. Form the shaped wooden base first, and get it quite correct. In the side-elevation-section of the figure, the black horizontal member (formed from a piece of fretwood glued on the main block) corresponds to the solid-lined shaped portion in the plan below. The radiator and interior blocks are attached to the base-member, as shown, before the




Full-size for OO-Gauge



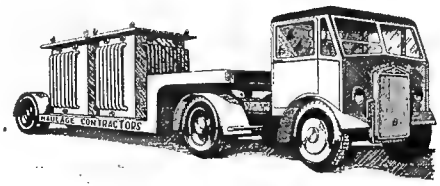



FIG. 133.—Wilson 8-wheel Tractor, Army Commando and Transformer Lorry

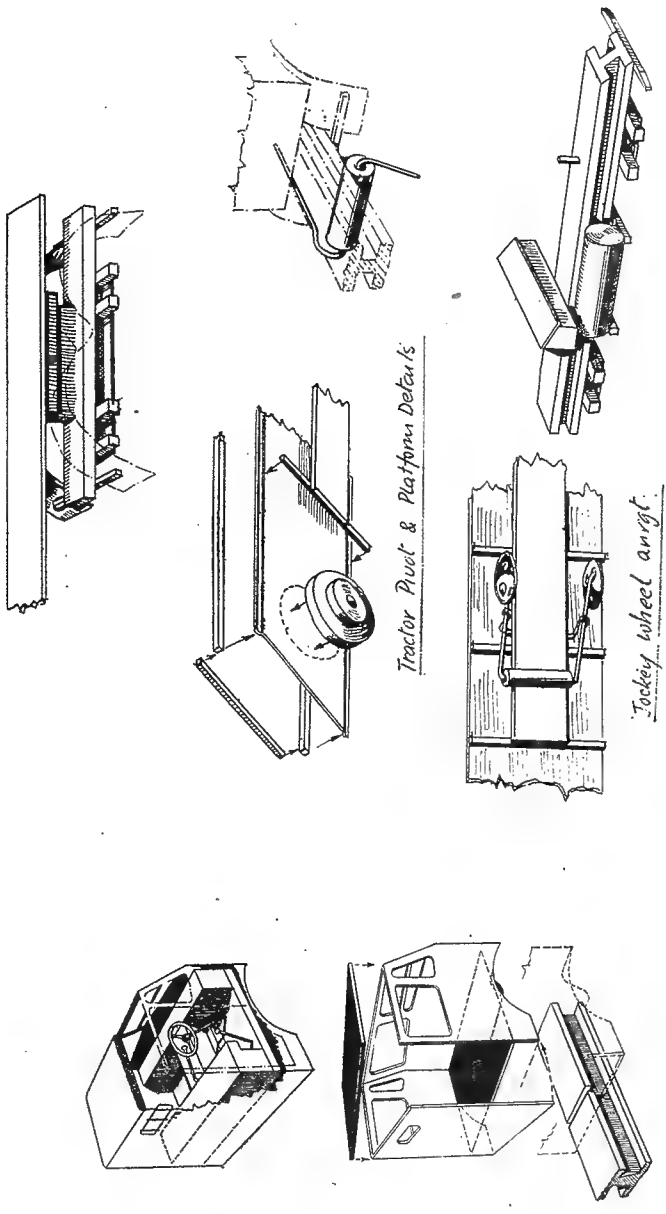



FIG. 134.—Wilson Lorry Constructional Details

shaping with sandpaper is done and before the notches are filed and cut for the Rawlplug axle-bearers. The thin strip forms the steps. The most difficult part of the work is the mudguards, which must be formed of several thicknesses of thin bristol-board, shaped (by coiling around a lead-pencil) before they are glued together. Several narrow strips are then superimposed upon each other to form a heavy bearing along one side underneath, these also being bent before being glued together. When the whole is set and strong, the outer edging is

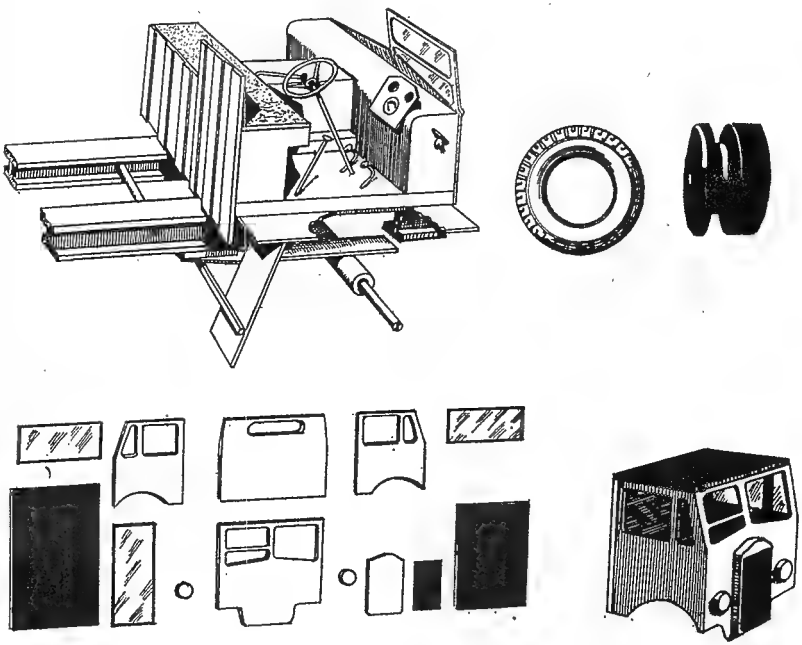


FIG. 135.—A detailed Wilson Cab Interior, Wheel Assembly and Plain Cab

sandpapered off as indicated. Fenders are made of metal strip and pins. The sandpapering of the body when completed, including the edges, corners and back end, is an important part of the work.

When the taxi model has been made, other cars will be found much more simple. The main task is to find a principle on which to work and to get well into the way of it; the worker should not be discouraged if his first attempt in this line is not an outstanding success.

There is another item which would serve to add a fine note

of realism to any model building on a layout. It is a push-cycle, and it is a feature which I have rarely either seen modelled or

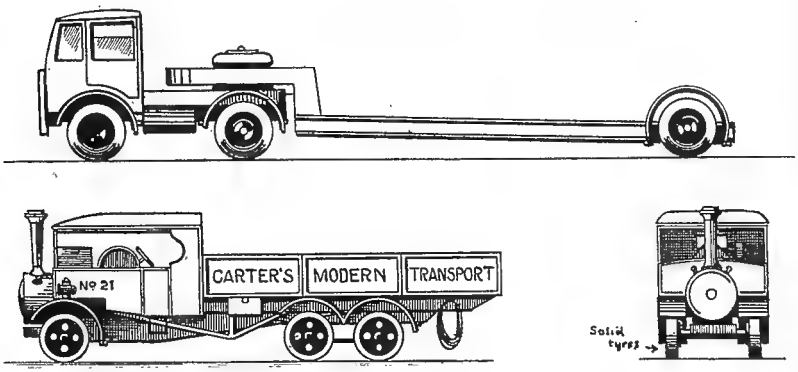



FIG. 136.—Tractor Transformer Lorry and Steam Lorry with Adapted Wagon Wheels and Wheel Hubs from Curtain Pulleys

found designed. It might be thought that considerable difficulty would be experienced in attempting it; but this is not so.

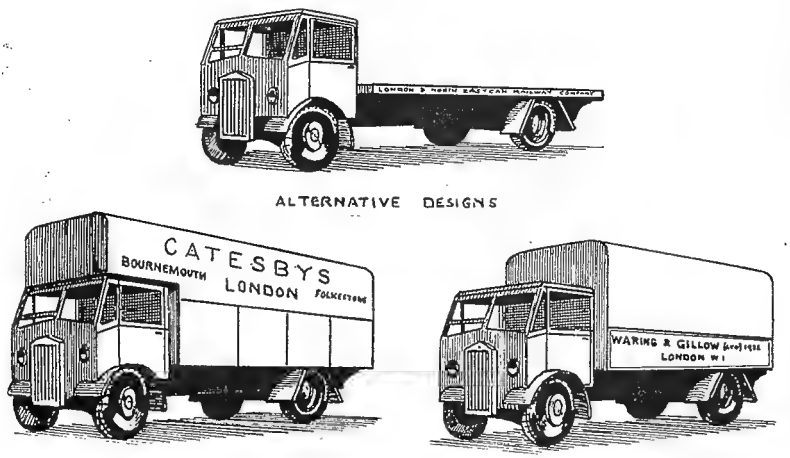



FIG. 137.—The Author's Card Sheet Lorries designed for Modelcraft

Even a minute model to the 4-mm. scale would not be at all exasperating if set about in the right way. To facilitate the work

I have given designs to full size for O- and OO-Gauges, and all that is necessary is to make the parts exactly to the sizes given. The wheels should consist of fine metal rings, which can be had as a commercial line from most firms selling materials. The

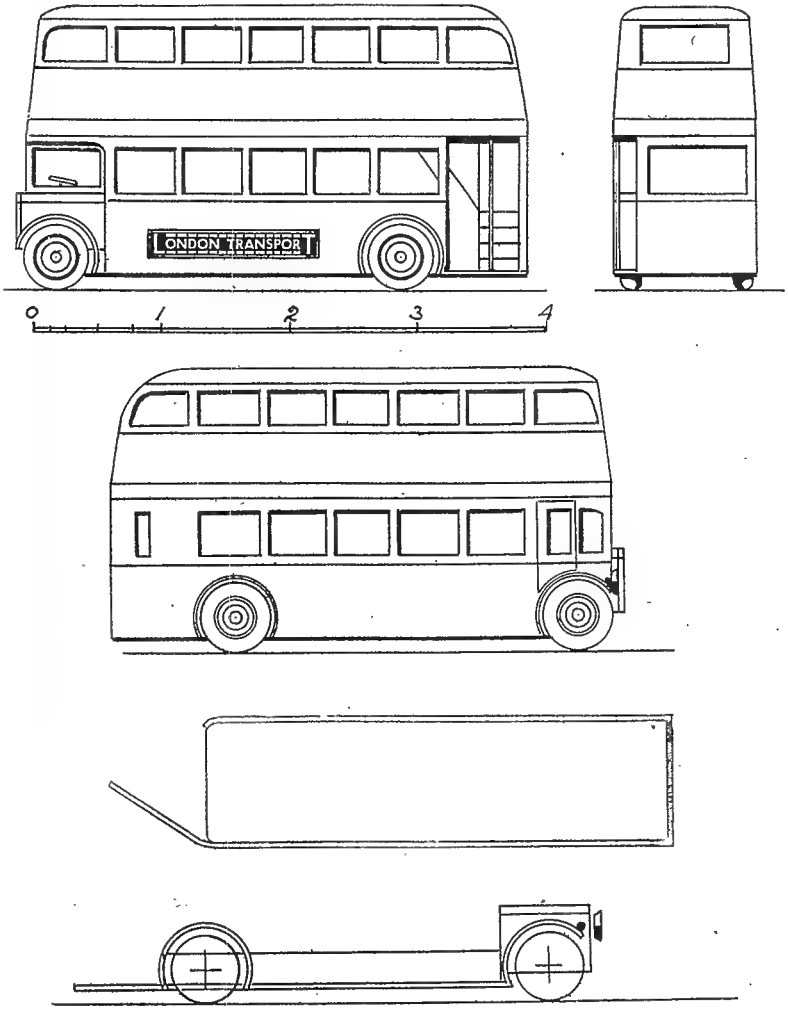



FIG. 138.—Elevations and Chassis Details for Double Deck Omnibus (OO-Gauge)

front and rear forks are made from twisted wire, with solder over the twist, carefully filed up smooth. The shaped handlebars are also wire, like the diamond frame and the pedal cranks.

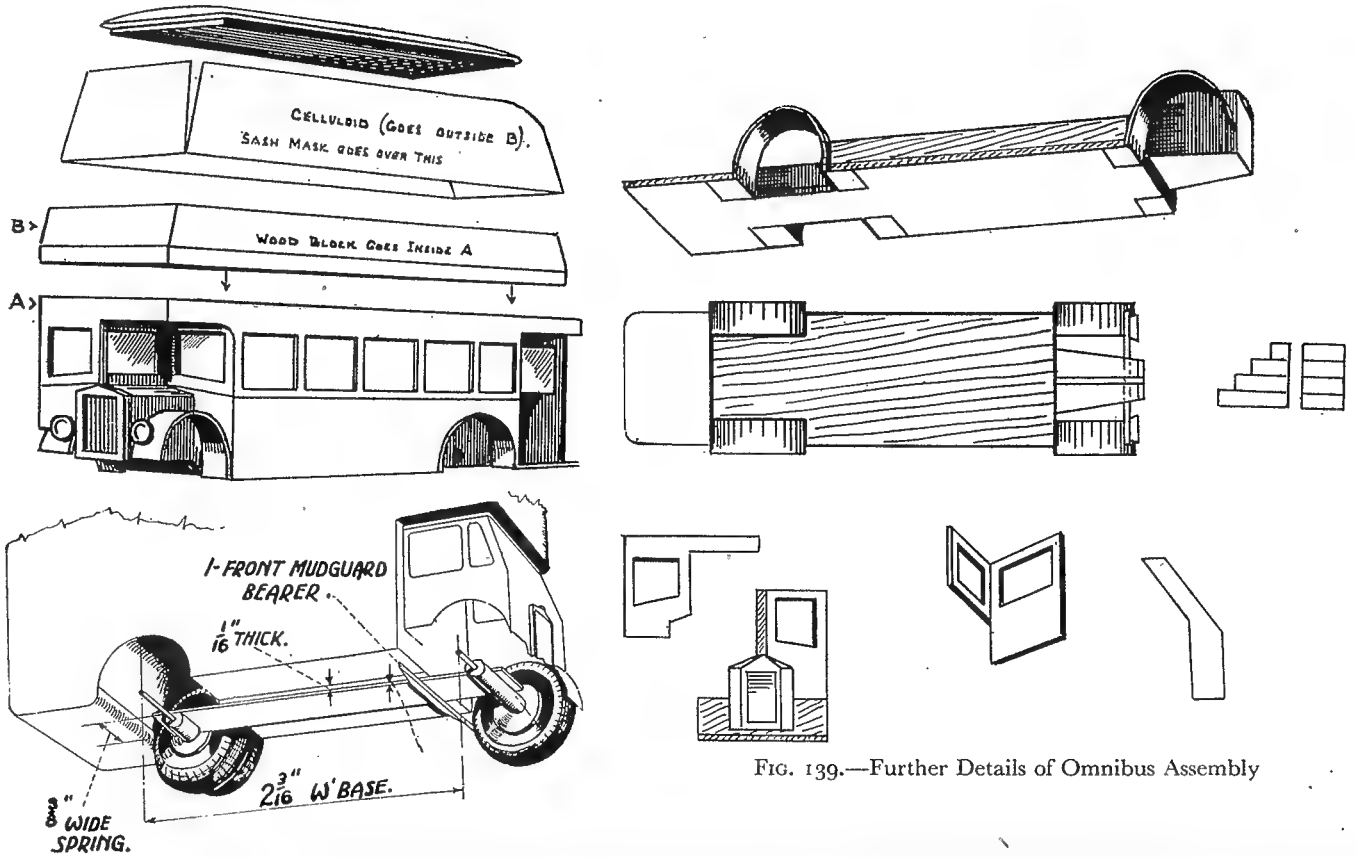



FIG. 139.—Further Details of Omnibus Assembly

A happy thought is to make the model a gear-cased type, for this will successfully eliminate the need of dummy gears and

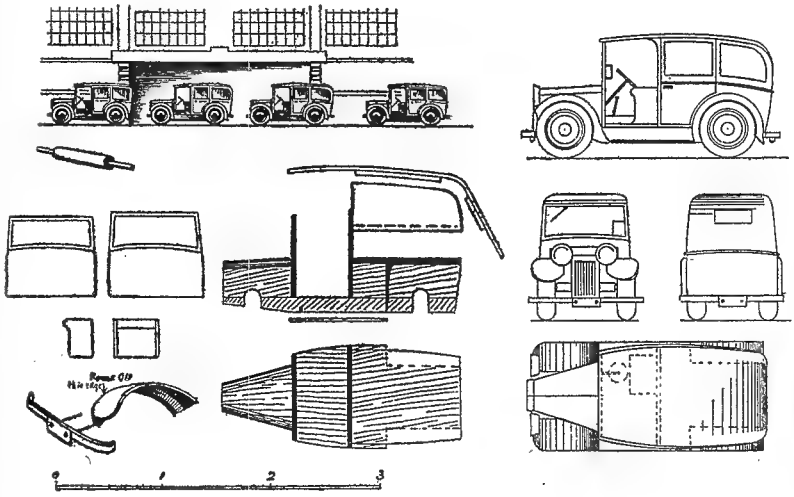


FIG. 140.—A 4-mm. Station Taxicab

chains. A single shaped piece of tinplate or shim brass will adequately serve the purpose. Shim brass, soldered to a piece

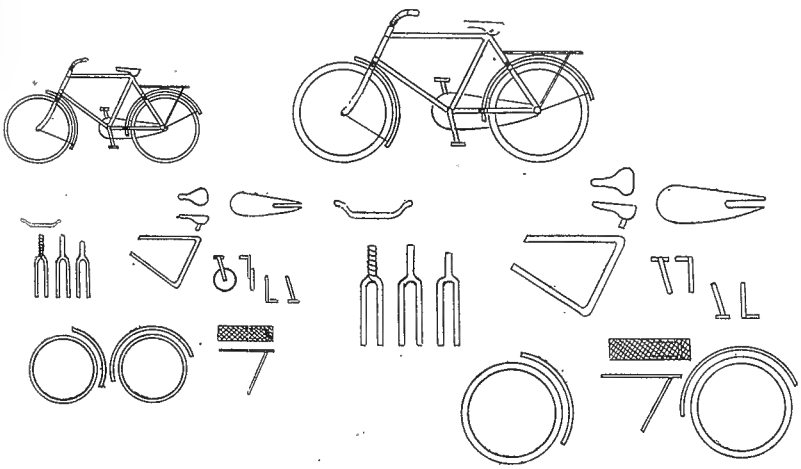


FIG. 141.—Full-size Details for Push-cycles in 4- and 7-mm. Scales

of wire, also serves for the saddle. Dummy hubs may be set between the ends of the forks when the wheels are soldered in place. The mudguards are of half-round wire, with fine wire

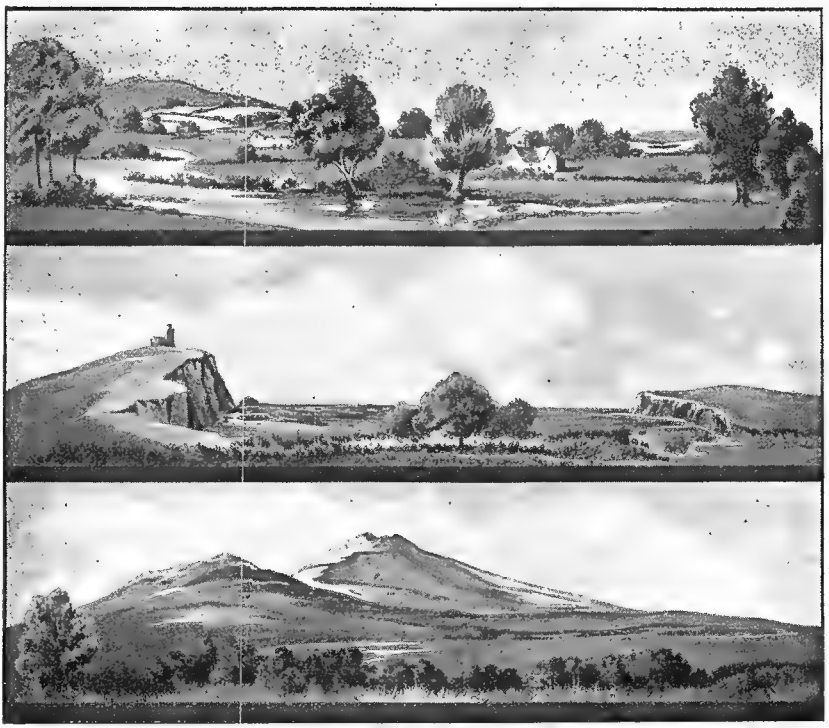
stays. The carrier consists of a shaped piece of wire gauze. Having modelled, with certain patience, one of these machines, you will want to do many more. Use nickel-plated wire for the handlebars and pedal cranks. The model may be painted black all over except for these items, but it will be improved if the insides of the wheels are left silver and the " tyres " painted dark grey. The wheels would normally be the most difficult feature, but fortunately even these need not be made by hand.

## BACKGROUND FLATS AND SEMI-FLATS

In many respects hand-painted background scenery is ideal for use as a rear wall covering behind a model layout, but it is not easy to obtain commercially and the work does not look realistic if painted by the average craftsman. Painted friezes can be bought and in many places these serve the purpose admirably, but there are many instances where the builder cannot find a commercial product to fit a specified place. City scenes are the hardest to make, and yet those on the open market may not appear correct for your terminal area.

Tall buildings are what one requires behind large freight yards, locomotive depots or passenger stations of the city order ; in fact they lend themselves to all manner of railway additions in the foreground. The work should be made up of " flats " formed of large sheets of coloured parcel paper, cut accurately to shape, and mounted on blue or white " cloud " wallpaper. This commodity can be had in normal times quite cheaply in rolls, and should form the basis of any sort of back scenery that is to be done by the amateur. The rolls are about 2 feet wide, which is ideal. They should be pasted or tacked on the plywood or other form of backboard, or on the wall itself.

For a long wall of high buildings it would be well to make a small drawing of what is to be done and later to copy this on the wall in the form of sheets of paper as required. The important thing is to have due regard to the movement of the perspective point for the back-slope of the various sides of the buildings, though the fronts will perhaps be in full profile and therefore rectangular. The method of securing this changed perspective is to use a long lath for marking, and to mark off the vanishing-points along the base at about every two feet. In the first drawing, these are marked 1, 2, 3, and 4, points 1 and 2 being



Three Examples of Trix Variable Background Frieze

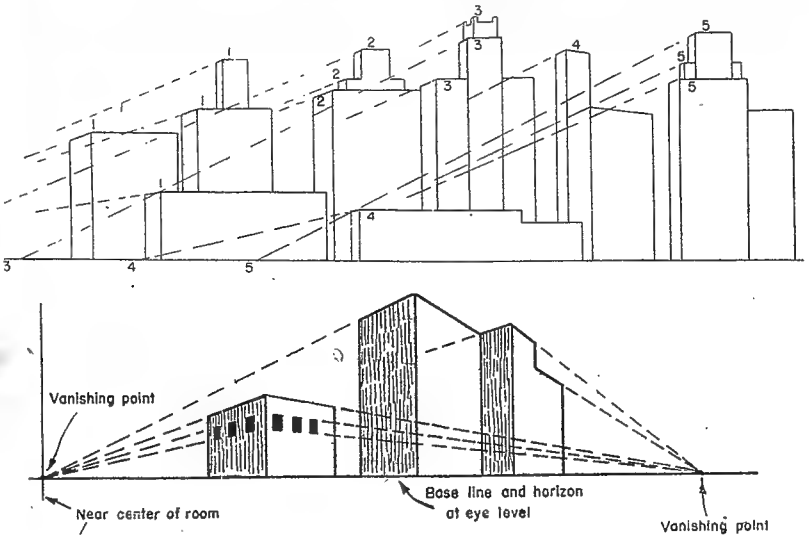



FIG. 142.—Working out Background Perspectives

actually off the scene. Each building takes its side slope from its independent number, and the same perspective line applied to all slopes of the building. Sketch this out on your small sheet of paper in pencil as you want it. Next take a large sheet of light grey concrete-coloured paper, big enough to make your scale building on the wall, or rather the front of it. Cut it to the rectangular shape you want it before fastening it permanently in place. Then make the side walls for the same building, and make them rectangular at first. Pin them in place with drawing-tacks, using a much darker shade of brown paper. When in place, mark off with a straight-edge the slope of all the tops of the walls in accordance with the perspective-point applying to this building. Now take it down, trim it, and carefully fix it in place finally, cutting edges with a knife and metal ruler and making a neat job. Continue to do this with all your buildings in the section under design, remembering to use a fresh perspective-point for every building.

For localities where the back-view is not full-faced, but in which buildings face streets running off at angles we can use a sketch on similar lines by Mr. Frank Ellison, which appeared in the *Model Railroader*. Here each building should be drawn from two vanishing-points. Furthermore, it is best to local the level of the vanishing-points in all instances at the same level, and that the level of the eye when standing before the scene.

The interesting detail work now begins. First, the cornices of the structure are put in by using thin and straightly-cut strips of assorted coloured paper—say reddish-brown, dark slate, or even white—with a much narrower strip underneath each one to represent the shading. Over the shaded side-walls use a darker-hued paper for cornices. Next, the windows may be created. For this purpose, use printed black windows with white sash bars (sold by Merco and others). There is also a silver-paper type that is just as effective for building fronts. Cut these carefully to whatever shape you need them, and be sure to stick them on absolutely level. Include in this job every window and door on the whole frontage. If you should fancy a string of freight wagons in the background theme, running, say, along the front of the building at a slightly higher level than the actual railroad, use for this purpose a set of printed freight or passenger car sides as sold for your respective gauge. Don't be content merely to stick these on the wall ; shade in the ends (one end of each car only) with a carbon pencil or with pieces

of black paper, and draw in the details. You can avoid drawing in the running gear by arranging a parapet retaining wall below.

Now get busy on the building sides. See first if you want to represent any extra shaded portion (see Fig. 143), and work this up in a still darker paper. Do this before attaching or including the windows. These will have to be arranged in perspective like the wall tops, and the best way to make them is with small pieces of dead black paper—no sash work is necessary —or they may also be drawn in with carbon pencil. The latter

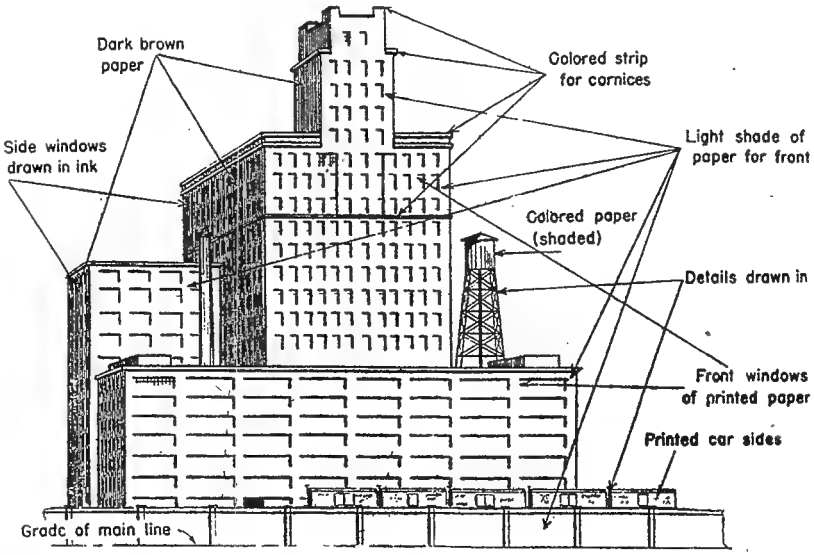

Dark brown paper
Colored strip for cornices
Side windows drawn in ink
Light shade of paper for front
Colored paper (shaded)
Details drawn in
Front windows of printed paper
Printed car sides
Grade of main line

FIG. 143.—Details for a Background Factory (Flat)

is the easiest way, as the work can be done straight off the perspective lath.

It is best to start on a substantially plain building. Later you can build a more elaborate and ornate structure if your fancy dictates. Such items as water towers, smoke stacks, fire escapes, etc., can be worked in shaded paper and filled out with the carbon pencil and ruler.

Of course, the use of shaded or darker paper on the sides depends entirely upon how you are going to represent the lights and shadows. You may entirely reverse the process outlined and, instead, make the fronts of the buildings dark and the sides light; but whatever you do to one building you must do to

the lot. The fall of light must, in other words, be absolutely logical. If you care to use a print of a locomotive, pick one in full colour and remember it must be in absolute flat profile and it must also be to scale size. You can then put in the black and white smoke and steam by using crayons, poster paints, or other mediums, but don't spoil the entire job by overdoing the effect.

This form of scenery is excellent also for the approaching corners of the walls, and the photo again gives a useful suggestion along these lines. One corner of your layout can be made to

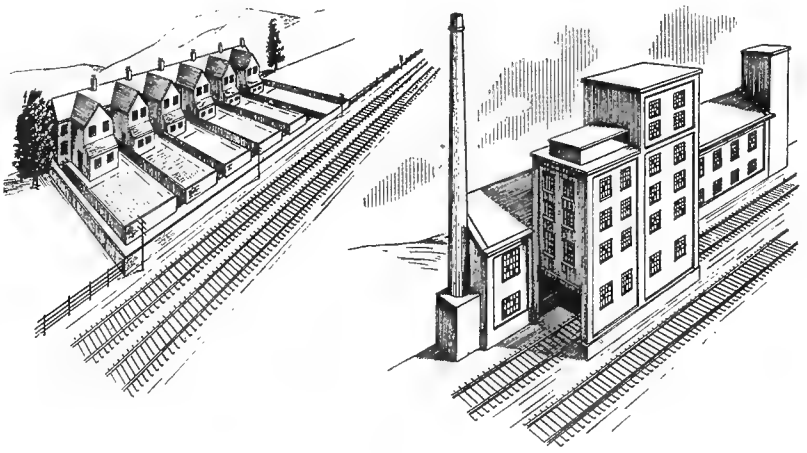


FIG. 144.—Two Ideas for Background Semi-Flats. The buildings are actually Half-Models

represent a continuation of corner blocks of buildings, or streets crossing at right angles.

Yet another useful suggestion. The idea is to work the scene up in a similar manner including the concourse of a large passenger terminal, so that nothing remains to be modelled except the train sheds. These can be designed as large or as restricted as necessary, but don't restrict the length. Instead of about five platforms, two may be found adequate. See that the building on the back sheet is in correct yet varied perspective with the surrounding structures. This matter of perspective is the thing on which realism depends, especially if photos of the layout are to be taken later.

The matter of breaking off from the city to rural scenery is also important, but does not offer grave difficulties. Generally

speaking, slope down the height of the city buildings gradually to the ends of the section where the blending must be done. Let your rural scene run in behind the end building. Similarly,

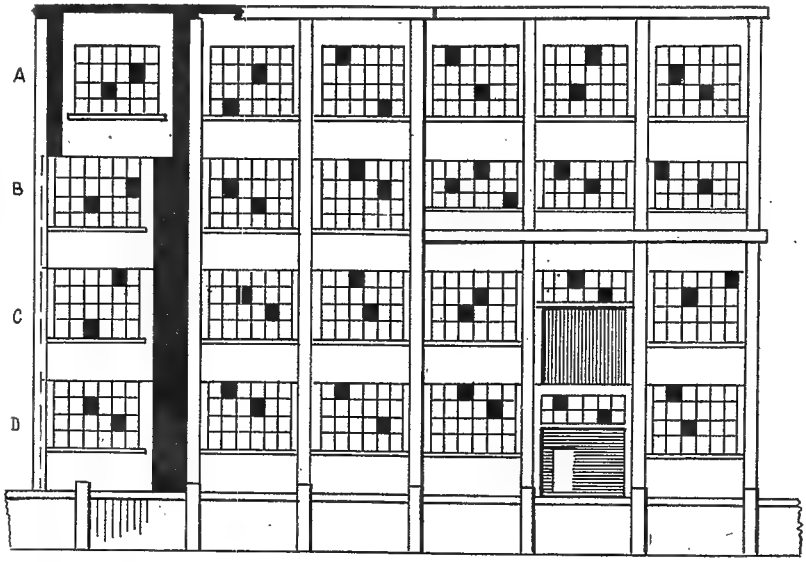



FIG. 145.—Mr. Wright's Scheme for Building Flats from Commercial Sections and Grooved Columns

dummy freight and other trains can be " ended " if desired by running them behind other projecting erections in the back scene.

# THE LAYOUT MONTH BY MONTH

## JANUARY

OWNERS of motor-cars are familiar with the schedules of stated duties for each month which the manufacturers issue in the pamphlets accompanying the sale of a car. I have often felt convinced that something of the same order might well be provided for owners of railway layouts. There is nothing more sound than the systematising of work when it is desired to sustain a regular and completed course of maintenance. The actual railways closely adhere to this method in every department, and if in the sphere of modelling we follow the same orderly precedent there will be small chances of suddenly discovering that chaotic conditions of affairs resulting from oversights and neglect. Much will depend, in framing such a scheme, upon whether or not the layout is indoors or out-of-doors, and whether the layout salon is well enough heated to work in it in winter or well enough lighted to allow work to be carried on at all times of the year. Much will require to be taken for granted in these particulars. It is, at all events, my intention to furnish such a scheme in so far as this is practicable. I have gone over the entire ground, thought back upon an experience covering over a quarter-century, and the instructions given, though they may at first appear arbitrary, are carefully synchronised with many very practical considerations arising from the period of the year and so forth.

Since certain other months are seasonable, and lend themselves to specific tasks on a layout, January may, oddly enough, be viewed as a month for jobs left over from a previous year. Details in mechanical engineering overhaul, such as gantry cranes, goods yard cranes, model ships and their fittings, their repainting or renovation, may at this point be attended to. Signal posts and gantries, lamp standards and other small features may be lifted and painted where necessary, this work being possible on a small table in a living room or study should the layout room be chilly.

On the other hand, the season being winter, if the layout room is heated nicely, January is a good month for operation, there being few enough outside attractions at this time. Winter operation is good for locomotives and rolling stock, and nothing is worse for these than to lie idle during the freezing weather, when the lubricants become congealed and the bearings clogged, especially in the smaller scales.

## FEBRUARY

For February there is the careful overhauling of the electrical supply and connections on the layout. This includes not only new work but the adjustment and tuning up of all existing circuits, cables, switches, solenoids and signals, as well as the overhauling of mechanical points and their controls. All spare time during the month might be concentrated upon these features. One specially profitable labour would be that of going all around the system tightening up fishplate bondings on conductor and running rails. During the course of a whole year it is astounding how these can become affected by running and traffic. One faulty connection of this sort on the outer conductor will hold up the entire power supply to the locomotives. Examine, again, all the connections of wires to batteries, transformers and switches. These may have become corroded or perished and will require renewal. At any part of a cable there may have developed a naked section of wire where the insulation has been rubbed off or burnt. OO-Gauge tinplate track may require sprigging down at certain places where rises have occurred and now threaten short-circuits with conductors ; view this as part of the survey of the power-supply. There may be contemplated alterations to the switchboards, and these should now be tackled. In short,

February is the best month to amend, to develop and to repair the entire power-supply system of the layout.

The majority of outdoor layouts are temporarily abandoned for running at this time of the year, though this will not necessarily apply to steam-operated systems. Many owners in fact enjoy the winter and even snowy conditions of operation during these months. It is not a bad time for outdoor construction work of the heavier kind, such as will keep the workers' circulation active, provided the weather is dry. But care should be taken, if possible, not to lay track in the frosty period. All track-laying, whether indoor or outdoor, should be relegated to the more temperate months of the Spring and Autumn; otherwise either expansion or contraction will cause havoc at the periods of extreme heat or cold.

## MARCH

March month is about the last opportunity for carrying our such work on the layout as will cause dust, dross and upheaval before the period of house spring-cleaning comes around. I tender to all enthusiasts the whispered counsel to keep in the good books of the domestic authorities by having regard for these solemn occasions, and suggest for this month the execution of important items in scenic constructive work. During the year there will have been a number of schemes for possible improvement passing through the mind, without doubt. These will in some instances involve quite extensive alterations to the baseboard structure, when rivers of hill scenery are to be formed of modified. There may be ideas in mind for a new swing- or lift-bridge, involving more or less drastic carpentering. Embankments, gradients, cuttings and tunnels, afforestation and tree-planting, additions to or corrections of scenic backsheets—all these items are more or less upheaving, and it will be well to get this kind of thing done now. Is there anything of this order that you propose?

Every three months we shall remind you to top-up your batteries, if these are employed in your current supply. March is one of the months we have nailed down for that purpose. Do not postpone this duty on any account, or you may overlook it until you are reminded again, and then it may be getting too late.

## APRIL

Warmer weather and better lighting will no doubt arrive to bless the month of April. Coincident upon these benisons there arrives the period of domestic Spring-cleaning. I suggest that whether your layout is in the basement or the attic you make sure that this delightfully exasperating operation begins there. You will call down an avalanche of righteous indignation upon your head if you are thoughtless enough to let the process fulfil itself throughout the entire house and then remember that you have still to begin on your part! Alternatively, you will hold up proceedings everywhere else if you do not push on your own job.

The spring daylight will serve to show up the untidiness, dust and other accumulations which need correction. Having removed the heavier debris resulting from your last month's scenic work, begin by thoroughly sweeping out the room. When this has thrown up the dust on the portions of the layout you were foolish enough not to cover with dust-sheets, you can get to work on the sandpapering of the surface of every inch of track and conductor-rail. For this purpose I myself use a tiny wooden block—the West Midland is OO-Gauge—around which a short coil of the finest glasspaper is wound. The block fits on the surface of the running rails between the outer conductors. Work away until the paper surface is useless, then turn another lap until the whole coil is used, whereafter another is substituted. Take care not to damage your fine switch blades or to misplace your conductor rails.

It goes without saying that in order to do this you have removed every item of rolling stock and every portable building first. When the tracks are cleaned, the next step is to take your vacuum cleaner—I myself use a Dustette—and go over the whole surface of the layout, into every corner, under every bridge, between every pair of rails and get out every particle of dust and dirt. You will be amazed at the first effect on a black surface. Now dust and clean under the baseboard, along the top edges of timber struts, and finally have the floor gently swept and thoroughly scrubbed. You can then bring in and replace all the stock and structures, being watchful to dust and clean them before doing so. For the roofs of buildings and coaches a large, unused painter's brush is best, with the occasional aid of a flannel duster. Clear out all the useless empty boxes, redundant

timber, empty paint tins, and anything else that clutters up the layout salon or your workshop. Spring-clean the workshop, too, if it is in the house.

Much the same will apply to an outdoor system, the cleaning-up of which may thus coincide with the spring garden clean-up. Weed your tracks before the gardener starts on the garden—otherwise he may probably damage the layout. If you have a terminus shed let that also be attended to and renovated. April brings us to the verge of the " open-air " months of the year, and you will enjoy operating the outdoor layout ten times more if you have thoroughly cleared up and rejuvenated it before those halcyon days begin.

## MAY

I recommend this month a concentration on the buildings and architectural structures of the railway, precisely as at this season of the year the task of house-painting and outside renovation is attended to. There will be new buildings in contemplation, and modifications or alteration to old buildings to be carried out. Look ahead and try to vizualise the requirements for the succeeding months of the year. Old signal cabins may be needing repair or improvement ; some of the small kits of yard buildings by advertisers may be obtained and made up. At all events, a thorough cleaning and maybe repainting of existing structures will be necessary.

May month we will also reserve for one of the periodic oiling-up occasions for locomotives, wagons and coaches. With locomotives, an excellent plan is to remove the mechanism from the superstructure, slip out the armature and brushes, if this is plain sailing, and wash the entire chassis in a bath of paraffin. This will take the paint off the wheels, probably, especially if it is a flat black ; but that matter can be rectified. Clean the bearings of the armature, and the brush gear, and replace them. Then oil the wheel bearings with cycle-oil and the main motor bearings with a heavier lubricant—a touch only on each occasion, applied with a piece of wire. If the brushes are of gauze, a light touch of clean vaseline on the commutator will be a good thing ; if carbon brushes are used this should be omitted. Tauten the springs of collecting shoes at the same time, and examine the wire leads from the shoe to the motor to see if they are sound.

Outdoor railways will this month be getting into full operation and the fine weather—if any !—will best be utilised for running and operating while the going is good.

## JUNE

June month is a good time for the overhauling of all passenger rolling stock. This includes attention to couplings, wheels, bogies, and retouching paintwork, as well as giving a clean-up to coach bodies. It will be found that automatic couplings will, after a year's use, probably need general re-adjustment, and this is best carried out by carefully overhauling one vehicle in this respect and afterwards using it as a test vehicle. Granted that it has been made mechanically perfect and has been meticulously aligned for coupling and uncoupling operations, all other units are adjusted to suit it. The same applies to locomotives in relation to the end coaches of solid-coupled trains and so forth. The wheels of rolling stock on an electrically powered layout have a way of becoming coated in the process of time with a grease-deposit which, if not watched, will actually cause derailments and will certainly give rise to sluggish running. The vehicle should be inverted and the treads of all wheels scraped with the end of a small screw-driver until absolutely clean. Bogie-pins should be examined, loosened or tightened as demanded. For the cleaning of most types of coach sides, a light rubbing over with a soapy sponge, not too wet, is good, provided that it is carried out quickly and the moisture dried off with a clean rag at once. Litho sides may even be thus treated if ordinary care is exercised, especially if they are of the varnished type. Retouching of paintwork can be a most improving procedure if the worker has normal skill in matching the colours. Roofs, especially, become scratched, and if made of metal have an unrealistic and untidy appearance. It may be well to paint the entire roof rather than to patch it up with colour. Remember in June also to top up the batteries and to test the quality of the acid.

For outdoor systems, June is the great month for operating, and the majority of owners will prefer to enjoy this work rather than devote time to construction. I recommend, therefore, as much operating as possible while the evenings are long and while we enjoy the measure of sunshine and good weather that normally comes with this month of the year. At the same time, occasion

may be found to carry out whatever renovation and adjustment of rolling stock in the passenger department is essential.

## JULY

The overhauling and oiling-up of passenger stock having been completed last month, the same operation might, during the portion of this month not spent in holidaying, be applied to freight stock. Precisely the same methods already outlined may be followed in this task. A reader of the *Model Railroader* recently carried out careful experiments with different grades of lubricant on freight stock, and he sets forth his findings at some length in a recent issue of that useful journal. Oils used were: (1) Sewing-Machine Oil, (2) Oil and Graphite mixed, (3) Clock Oil. The running results on the same gradient, from a dead stand, were according to the proportions of 21, 17 and 33, which left no doubt that clock oil was the best in its results. The same writer claims that this lubricant stays put longer and gums less rapidly than the others.

The major portion of this month will doubtless be spent away from home, and the opportunity will not be missed of taking photographs required for the winter's work. When you cannot photograph, you can walk about and take mental notes and make drawings on returning home. Remember therefore to take on your holiday a drawing outfit as well as the usual supply of railway modelling literature and magazines. If holidaying in London, be sure to tour every shop for inspection. No really serious enthusiast ever dreams of laying aside the craft during the summer vacation time. It is usually for him the busiest and richest period of the year, for it gives him an unrivalled chance of visiting new scenes, noticing fresh rolling stock, inspecting locomotives, depots and stations.

Garden railway owners will desire to put in all the operating they can while the going is good, if they are at home. Possessing an outdoor system, one has to put as much construction, maintenance and repair work in during the shorter days of winter, so that the congenial weather and the daylight may be used to full advantage in the running of traffic.

Another excellent idea in travelling, especially by car, is to make a note of any important layouts owned by people whose homes one will be passing; to write a line before leaving home, enclosing a stamp and asking for an interview, and making as many such calls as possible.

## AUGUST

Continue this month with freight rolling stock work, completing what was left incomplete last month. Working among wagons will remind the owners of specimens he does not possess, and this is a good moment at which to obtain designs for special rolling stock required. Reference may be made to back numbers of periodicals and magazines for this purpose, or blue prints may be obtained from the firms which retail them. A few drawings may be roughly sketched out.

Before the evenings begin to shorten, there will be work to do on garden layouts, and the month of September will see an end to much more opportunity before the winter sets in. Many owners will still be away on holiday, but a return home will probably be made in August, and what remains of the month should not be entirely lost, whether on outdoor or indoor tasks, but especially the former.

## SEPTEMBER

I would recommend for September's indoor work any alterations to the nature of the layout itself. For all manner of track-laying, this is the very best time of the year, the temperature being mean and mild, neither too hot nor too cold. At all events, if rather too cold than too hot, September is still the best month, since shrinkage at the time of track-laying is better than expansion. It will be found, therefore that warm September days are ideal, since they will not be too warm.

Top up your batteries, clean their terminals and vaseline all terminal threads. Observe if batteries are requiring fresh acid or attention on the part of an electrician.

Now is practically the last chance for any extensive work on outdoor O-Gauge systems, and during the month of September it may be thought even necessary to do a certain amount of temporary dismantling for the winter. The layout in the open will still be capable of enjoyable operation, but an eye should be kept on the weather, and at anyrate a surreptitious attention should be given to the thought of packing up and stowing away, unless buildings and structures are really meant to withstand the winter's elements.

## OCTOBER

With October there will come the thought of evenings spent in the workshop, however humble that resort may be. The workshop may accordingly be thoroughly cleared and tidied ready for forthcoming operations. Are any improvements to lighting (natural or artificial) required? What about heating? Tool equipment? Bench and shelf accommodation?

Locomotives ranking first in order of importance on any layout, when the shop is ready, work on these may be undertaken. There will be motors to repair or to adjust, brushes and commutators to replace.

New locomotive work may at this time be undertaken, drawings and photos and other details being obtained for the purpose. The same remarks apply to rolling stock. No doubt this work will penetrate well into the winter, or maybe beyond that time; but now is the occasion for a start.

Although the thorough cleaning of the layout should be reserved for the period immediately preceding Spring, it is well to have a kind of mild Spring-cleaning every six months; any time therefore than can be found may thus be employed in October. The clearing of all trackage should especially be repeated in October as in April. Garden railways will be more or less closed down now, and rolling stock either stored or relegated to indoors. It would do no harm to give immovable bridge girders a coat or two of paint before the winter, if out-of-doors.

## NOVEMBER

Work on locomotives will continue during November, with new constructions, painting and lettering. Owners of layouts out-of-doors, or largely so, will probably concentrate now on constructional work for which there was little time when the weather was congenial to operation. It may be well, therefore, for these owners to glance over the list of summer duties and to ascertain if anything serious has been overlooked.

Winter is the ideal season for indoor operation, and, apart from a maintenance of such locomotive and rolling stock work as has thus far been undertaken, there will be little time for anything further in this connection. During November it would

House Construction on Mr. Ahern's Layout, and (bottom picture) Cardboard Goods Loco on the W.M.R.

be well to note the condition of the lighting and heating of the layout room, so that for the remaining cold months the operator might proceed to his interests with comfort.

## DECEMBER

What about some experiments at this stage in the improvement and development of timetable working? If there are young folk in the home, their school holidays will shortly begin, and it would be an excellent thing to have everything in working or, from this standpoint, before that occasion.

If the order of procedure here given has been reasonably followed, it will be found that December will have an ample margin of whatever spare time the operator possesses, immune from the demands of repairs or renewals or maintenance. But there is one important duty left for December—top up the batteries again !

# HAMBLINGS

## THE PIONEERS OF "OO" GAUGE

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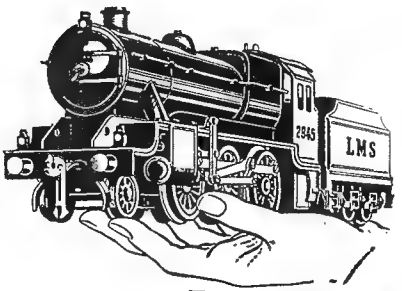


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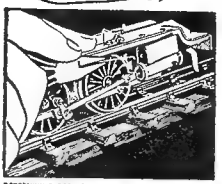
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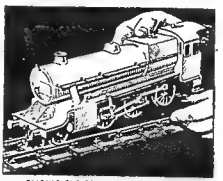
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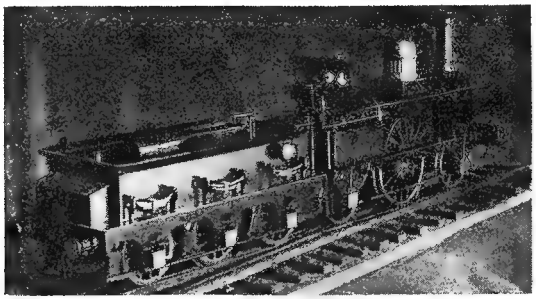

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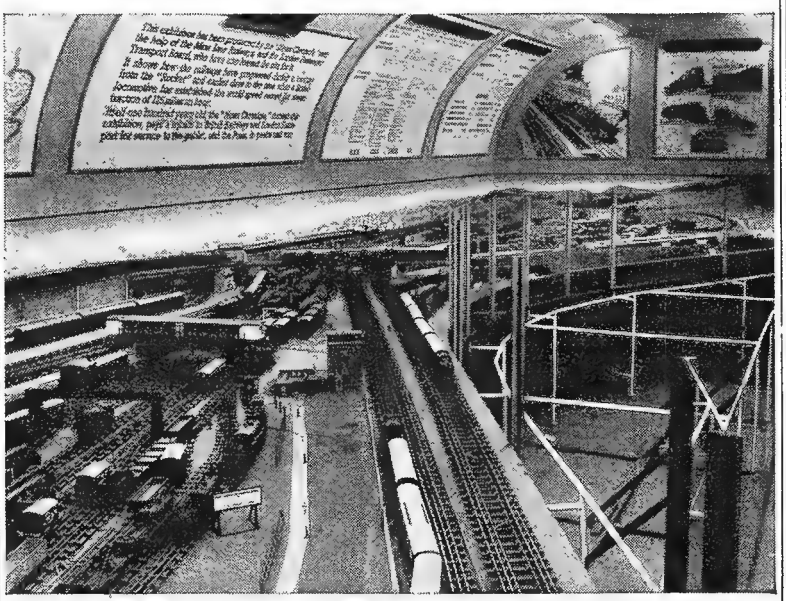

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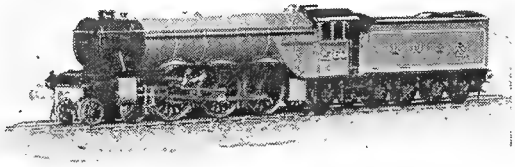

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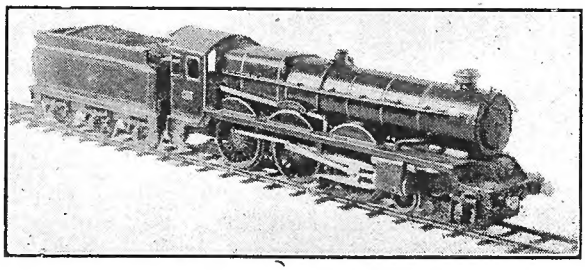

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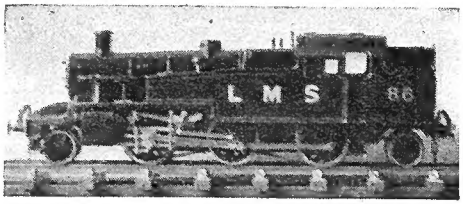


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